A Study on Depression among Patient with Type 2 Diabetes Mellitus in North-Eastcoast Malaysia

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Abstract

Introduction: Diabetes Mellitus is becoming increasingly prevalent worldwide and is often associated with depression due to a multiple factors.

Aim and Objectives: The objective of the study was to determine the prevalence of depression and the factors associated with it among type 2 diabetes mellitus patients.

Methods / Study Designs: This is a cross sectional study involving a total of 260 respondents from Diabetic Centre (DMC), Hospital Universiti Sains Malaysia (HUSM) in North-Eastcoast Malaysia. Subjects were screened for depression using Hospital Anxiety and Depression Scale (HADS) questionnaire. Another questionnaire was also given to identify the associated factor linked to depression.

Findings: The prevalence of depression was 12.3% (32 out of 260 respondents). Level of education (OR: 0.38, $p < 0.05$) and the presence of complication (OR: 3.09, $p < 0.05$) were significantly associated with depression.

Conclusion: Depression is a common condition associated with diabetes mellitus and it is related to the presence of diabetes complication.

Key words: prevalence**,** depression, type 2 diabetes mellitus, Hospital Anxiety and Depression Scale (HADS), associated factors, Malaysia

Introduction

Depression is an important global public health problem due to both its relatively high lifetime prevalence and the significant disability that it causes. It is responsible for the greatest proportion of burden attributable to non-fatal health outcomes, accounting for almost 12% of total years lived with disability worldwide.[1]

Diabetes mellitus is also highly prevalent in the community. The World Health Organization (WHO) predicts that more than 360 million people worldwide will have diabetes by 2030.[2] In Malaysia the latest Third National Health and Morbidity Survey already showed an increment of prevalence of Diabetes mellitus to from 8.3% to 11.6% .[3]

There has been increased attention given to how psychological issues affecting Diabetes Mellitus (DM) self-management, as well as the psychological consequences of having the diagnosis. Being diagnosed with diabetes is a major life stress. It requires a large number of physical and mental accommodations. The individual must learn about a complex system of dietary and medical interventions. Lifestyle, work, and school schedules may have to be altered. This can consume a lot of energy for both the individual and his or her family. Just as important, are the psychological adjustments. As a result of this, many newly diagnosed diabetics go through the typical stages of mourning which include denial, anger, depression and acceptance.[4]

The constant stress of maintaining tight glycemic control can result in two types of psychological distress (a) sub clinical emotional distress, and (b) diagnosable psychological disorders.[5] Additionally, psychiatric conditions can occur independently without being a consequence of DM. A systematic review of 47 studies in USA identified the mean prevalence of depression was significantly higher (23.4%) in diabetic patients compared to the controlled group.[6]

There have been few studies which have looked into factors which are linked to depression in diabetic patient. Robert *et al.,* (2004) did a study on diabetes, depression and quality of life involving 2,370 subjects in South Australia.[7] They have found that female gender, older age, social isolation, low education, financial strain, functional impairment and sleep problems were predictive of future depression. In the study they concluded that failure to detect and manage depression may compromise the management of diabetes itself.

The aim of this study is to determine the prevalence of depression and the factors associated with it among patient with diabetes mellitus.

Subject and methods

This is a cross sectional study carried out from 1st November 2007 till 1st March 2008 among 260 patients suffering from diabetes mellitus. It was conducted at in a tertiary center in the East Coast of Peninsular Malaysia (Hospital Universiti Sains Malaysia). Subjects of the study include all adult diabetes mellitus Type 2 aged more than 19 to 60 years old. The exclusion criteria included Diabetes mellitus Type 1, mental disorder, patients who are either, deaf, mute or blind and

illiterate patients. The Hospital Anxiety and Depression Scale (HADS) Questionnaire was used as the screening tool for depression.

Hospital Anxiety and Depression Scale (HADS) Questionnaire was developed for use in general medical out-patient clinics but is now widely used in clinical practice and research.[8] The HADS is a self reported questionnaire. The Malay version of HADS questionnaire was developed by Fariza *et al.*.[9] Even though most of other studies found that score of 11 was the best cut off point, a score of 11 and above in detecting depression for Malay version HADS will miss a higher portion of population with depression. From the validation study, it was found that score of 9 in each subscale was the best cut-off point which showed a sensitivity of 93.2% and specificity of 90.8% for depression.[9]

The protocol was approved by the Research and Ethical Committee, School of Medical Sciences, University Sains Malaysia on 22 October 2007

Data Collection

The subjects were identified during their regular diabetes clinical follow-up and were selected using a systematic random sampling method. The subjects were approached based on the ratio of 1: 2 centered upon registration lists at the clinic. Written informed consent was obtained from the subjects.

Subjects were then given a set of HADS questionnaire by the researcher after completing the interview session for general questionnaire which includes demographic data and medical history. For those who have a score of nine either for depression, anxiety or both items, they were given an appointment date to see the psychiatrist for further assessment to confirm the diagnosis and for further follow-up.

Statistical analysis

Sample size calculation was done for all the objectives and the biggest sample size was chosen for the study. The sample size chosen was based on the calculation of prevalence of 19% (using the prevalence from Engum et al. in 2003[10], with power of 80% and non response rate of 10%. The sample size calculated was 260. All data was entered and analyzed using Statistical Program for Social Sciences (SPSS) version 12.0 (SPSS Inc.2003). The continuous variables were described in mean and standard deviation (SD) while frequency and percentages was used for categorical variables. Simple logistic regression was used as a screening in selection of variables for further analysis. All variables with P value less than 0.25 were included in the multiple logistic regression analysis. The method that was used for variable selection was backward and forward stepwise procedure. All possible 2 way interactions were checked and those significant variables were included in the model. The independent variables were fitted into multiple linear regression and variance inflation factors were obtained to check for multicollinearity. Results presented as 95 % confidence interval and adjusted odds ratio. The level of significance was set

as $p < 0.05$.Fitness of model was tested by Hosmer Lemeshow Goodness of Fit test, the classification table and receiver operator characteristic curve.

Results

Socio-demographic characteristics of respondents

A total of 260 respondents were interviewed. The mean age of the patients was 50.8 years old. The youngest patient was 28 years old while the oldest was 59 years old. The majority of the respondents (52.3%) were female patients and almost all the respondents were still married (93.1%). All of the respondents had formal education with the majority of them (76.9%) had at least secondary school education level and majority of them (53.1%) were currently unemployed. There was a higher percentage of respondents only attaining primary school education in the depression group. (Table 1)

Prevalence of depression

The prevalence of depression among adult diabetic patient in this study was 12.3 % (32 out of 260 respondents) (95% CI: 8.31,16.29).

Medical characteristics of the respondents

The mean duration of diabetes mellitus was 7.3 ± 5.5 years. The mean HbA1c was 8.5 ± 1.8%. The summary of the medical factors of the respondents is shown in Table 2. Higher percentage of subjects with depression reported having diabetic foot and retinopathy compared to those in the non depression group. Majority of the respondents (78.1%) was compliant to follow up with majority of them from the non depression group. (Table 2)

Multiple logistic regression analysis of significant variables with their relation to depression among adult with type 2 diabetes

The result showed that the predictors for depression among adult with type 2 diabetes were level of education and the presence of complication. Compared to those with low level of education, those with higher level of education were less likely to get depression.(OR 0.38, 95% CI: 0.19, 0.72). Those with complications were more likely to have depression compared to those without complication (OR 3.09, 95% CI : 1.47,6.59). (Table 3)

Discussion

Mood and psychotic disorders are among the most common psychiatric disorders in the general population.[11] Depression is well recognized to be associated with chronic diseases and non-psychiatric medical illness. There are researchers that suggest mood and anxiety disorder are more prevalent among adult with diabetes mellitus.[12-14] Due to the increasing rates of depression in this group of patients, thus it is important for us to understand the disease and plan mental services for diabetic patients. Early detection and treatment of depression will lead to improve in glycemic control.[15]

The prevalence of depression among patient with diabetes mellitus in HUSM was 12.3%.
To the best of our knowledge, there is no reported study on the prevalence of depression among adult type 2 diabetes mellitus in Malaysia. Engum *et. al.* in 2005 did a population study comprising 60,869 individuals with type 1 and type 2 diabetes in Norway using HADS questionnaire.[16] The prevalence in their study was slightly higher than ours (19.0%). Another study in United Kingdom by Lloyd *et al.,* which also used HADS as a screening tool found the prevalence of depression to be 21.0%.[14]
The prevalence of depression in our study was also much lower compared to a study done by Rahman et al. in Bangaldesh.[17] Their study population reported a prevalence of 34.8%. Similar to this is a study done by Tiffany *et al.* It was a cross-sectional study of 183 African-American adults aged 35–75 years with Type 2 Diabetes who were recruited from two primary care clinics in East Baltimore, Maryland. Using the Center for Epidemiological Studies Scale (CES-D≥22) they found that found that the prevalence of depression was 30.0%.[18] This finding was similar with a study done by Bagher *et al.* The prevalence of depression in their study was 41.9% which was much higher than our study.[19] It was cross-sectional study involved 375 T2DM from diabetic clinic in Iran. Patients were screened for depression using the Beck depression inventory (BDI).
The finding in our study was lower than these studies due to some factors such as smaller number of sample size, different source of populations, types of screening tools used and cut off point for diagnosis of depression.

Although various social factors may be associated with depression among Type 2 Diabetes mellitus, age, gender, race, marital status, level of education and occupation were the factors most frequently cited with its occurrence.[10] A study done by Katon *et al.* noted that younger age, female and being single were significantly associated with major depression.[20] This study was conducted among 4,193 diabetic patients from primary care in western Washington using PHQ-9. Similar finding was noted by Egedee *et al.* who conducted a community study among 1810 diabetic persons in the U.S. using CIDI-SF.[21] Our study was unable to show a significant association between these factors, most likely because the imbalance in the total number of the respondents. In our study, the mean age for depression was 50.9 years old, majority (61.1%) were female, and married (92.6%).

The only social factor that was found to be associated with depression in this study was the level of education. Those with higher education were less likely to be depressed. They may have a better a better understanding of the nature and the course of the disease and thus are more likely to be adherent to the diet, exercise and drug regimens. These patients may have better coping skills in dealing with their illness compared to those with low educational background. Their knowledge about the disease may be the protective factor against depression.

The medical factor which was associated with depression in our study was presence of complications. Vileikyte et al. revealed that patients with type 2 diabetes who had more long-term complications and concomitant medical disorders reported significantly more depressive symptoms.[22] Previous studies have been done to evaluate the different types of diabetic complication such as diabetic neuropathy, diabetic nephropathy and others and its association

with depression. Loretta *et al.* did a study using HADS depressive symptoms in 494 patients in tertiary center.[23] In their study, their objective was to investigate the association between diabetic neuropathy severity and depressive symptoms in a sample of patients whose neuropathy was diagnosed by well established, objective tests of neurologic dysfunction. However in our study there was no significant association of these factors probably because majority (78.1%) did not have diabetic nephropathy.

Our study failed to show any significant association between the specific complication with depression. Our study also failed to show the association between cardiovascular complication with depression. This is supported by Fazirah et *al.* did a study to determine the prevalence of depression and/or anxiety following an acute coronary syndrome in Hospital University Sains Malaysia.[24] She found that there was no significant association between depression and acute coronary syndrome in people with diabetes mellitus.

The study also looked at the association between diabetes control and concomitant disease with depression. The mean HbA1c in our study population was 8.5% which was comparable to another study done in an urban academic primary care centre in Malaysia.[25] However we failed to see any association between the HbA1c and depression. This is similar to a cross sectional study of 183 African-America adult aged 35-75 years with T2DM from 2 primary care clinics in Maryland, USA using CES-D for assessment of depression.[17] In their study, they found that depressive symptoms were not associated with level of HbA1c. However this was in contrast with a study done by Katon *et al.* In their study, they found that having an HbA1c level $\geq$ 8.0% was associated with significantly increased odds of having major depression in younger but not older (65 years) patients.[19] The fact that higher HbA1c levels are associated with major depression in younger but not older patients may be because there are significant differences in these two populations. In our study, we only focus on the adult T2DM and did not focus on the differentiation between the young and elderly.

Comorbidity was associated with depression in T2DM in study done by Engum *et al.*.[10] This study tries to look into the link between medical issues and depression. It showed that the presence of the concomitant illnesses puts the patient at a higher risk of developing depression. Surprisingly in our study, the numbers of medical problems were found not to be associated with depression. The possible explanation might be due to different methodology used. In the later study, the chronic illness was assessed based on self reported questionnaire.

There are few limitations in this study. The study was done in a homogenous community where the respondents were Malays. The findings would not be representative of the Malaysian population which is more multicultural. The issue whether race has any implication in the prevalence of depression cannot be determined from this study.

Conclusion

Depression is a common condition associated with diabetes mellitus and it has a huge implication on the management of diabetes. Health care personnel therefore should take the initiative to screen this condition especially in patients who presented with multiple

complications. Better outcome in patients' overall care and quality of life will be achieved by managing both the depression and diabetes concurrently. However further study need to be done to clarify the association between the two and help those at primary care level to design an appropriate intervention program.

Competing interests: None

Authors' contributions:

a. Conception and design : Roshana M and Azidah AK
b. Acquisition of data and analysis : Roshana M and Azidah AK
c. Interpretation of data : Roshana M , Azidah AK and Lili Husniati Y
d. Drafting : Roshana M and Lili Husniati Y
e. Critical revision and Final approval of completed manuscript : Azidah AK and Lili Husniati Y

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Table 1: Demographic characteristic of study population

Variables	Overall n (%) n= 260	Depression n(%) n=54	Non depression n(%) n=206
Age (year)	50.9 (6.3)	50.9[a] (6.3)[b]	50.6[a] (6.5)[b]
Gender			
Female	136 (52.3)	33(61.1)	103(50.0)
Male	124 (47.7)	21(38.9)	103(50.0)
Marital status			
Single	2(0.8)	0(0)	2 (1.0)
Widow/Divorced	16(6.1)	4(7.4)	12(5.8)
Married	242(93.1)	50(92.6)	192(93.2)
Education			
Primary	60 (23.1)	19(35.2)	41(19.9)
Secondary	134 (51.5)	24(44.4)	110(53.4)
College/University	66 (25.4)	11(20.4)	55(26.7)
Occupation			
Unemployed	71 (27.3)	19(35.2)	52(25.2)
Retired	51 (19.6)	6(11.1)	45(21.8)
Self employed	42 (16.2)	6(11.1)	36(17.5)
Private sector	21 (8.1)	12(22.2)	9(4.4)
Government sector	75 (28.8)	11(20.4)	64(31.1)
Income			
<RM500	102 (39.2)	26(48.1)	76(39.9)
RM501-RM1000	41 (15.8)	7(13.0)	34(16.5)
>RM1001	117 (45.0)	21(38.9)	96(46.6)
Satisfaction with income			
Not satisfied	19(7.3)	7(13.0)	12(5.8)
Least satisfied	41(15.8)	9(16.7)	32 (15.6)
Occasionally satisfied	161(61.9)	32(59.3)	129 (62.6)
Satisfied	33(12.7)	4(7.3)	29(14.1)
Almost satisfied	6(2.3)	2(3.7)	4(1.9)

[a] mean [b] standard deviation

Table 2: Medical characteristics of the depression and non depression group among adult with type 2 diabetes

Variables	Overall n (%) n = 260	Depression n(%) n=54	Non depression n(%) n=206
Duration of DM	7.3(5.5)	53.0[a] (5.2)[b]	50.7[a](6.5)[b]
Hb1Ac	8.5(1.8)	8.8[a] (2.2)[b]	8.4[a](1.7)[b]
Concomitant diseases			
0	42(16.2)	10(18.5)	32(15.5)
1	46(17.6)	10(18.5)	36(17.5)
2	152(58.5)	28(51.9)	124(60.2)
>2	20(7.7)	6(11.1)	14(6.8)
Presence of Complication	164 (63.1)	43 (79.6)	121(58.7)
Retinopathy	97(37.3)	29(53.7)	68(33.0)
Nephropathy	57(21.9)	11(20.4)	46(22.3)
Coronary artery disease	17(6.5)	3(5.6)	14(6.8)
Stroke	10(3.8)	4(7.4)	6(2.9)
Diabetic foot	45(17.3)	23(42.6)	22(10.7)
Compliance	203(78.1)	36(66.7)	167(81.1)
Types of medication			
OHA only	185(71.2)	36(66.7)	149(72.3)
OHA and insulin	65(25.0)	18(33.3)	47(22.8)
Insulin only	10(3.8)	0(0)	10(4.9)

[a] Mean [b] Standard deviation

Table 3: Multiple Logistic Regression analysis of associated factors with depression among adult with type 2 diabetes

Variables	Adjusted OR[a]	95% Confidence interval	p value[b]
Education			
[c] Low level	1		
[d] High level	0.38	0.19,0.72	0.004
Complication			
No	1		
Yes	3.09	1.47,6.59	0.003

[a] Odd ratio
[b] Wald statistic
[c] primary school
[d] secondary school, college/ university