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PREVALENCE OF DEPRESSION AMONG PATIENTS WITH TYPE 2 DIABETES MELLITUS AND ITS PREDICTORS; A CROSS SECTIONAL STUDY IN PRIMARY CARE SETTING, MALAYSIA

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ABSTRACT
Objectives: The prevalence of depression among patients with diabetes mellitus has been reported to be higher than normal population. This study assessed the prevalence of depression among patients with type 2 diabetes mellitus in east coast Malaysia and its associated factors. **Methods:** A cross sectional study was done on 103 patients with type 2 diabetes mellitus attended primary care clinic in Kuantan, Malaysia from July to August 2015. A self-administered questionnaire using the validated Depression and Anxiety Stress Scales 21 (DASS 21) Malay version was used to assess the level of depression among patients with type 2 diabetes mellitus. The questionnaire also comprised of sociodemographic and clinical characteristics of patient in order to assess for association. Association were tested using chi square test and logistic regression. **Results:** Of 103 patients with type 2 diabetes mellitus, the prevalence of depression was 12.6%. Female gender and recent significant life event were significantly associated with depression ($p < 0.05$). **Conclusion:** Depression is a common condition associated with diabetes mellitus and it has significant relationship with gender and recent significant life event. Physicians managing patients with diabetes mellitus should therefore take the initiative to screen this condition at any given opportunity especially among female patients and patients with recent significant life event.

KEYWORDS: Diabetes mellitus; depression; prevalence; primary care.

INTRODUCTION
Depression is an important global public health problem due to its high lifetime prevalence and the significant disability that it may cause. It is responsible for the highest proportion of burden attributable to non-fatal health outcomes accounting for almost 12% of total years lived with disability worldwide.[1] Depression is a disorder with many adverse consequences including physical disability[2], worsened adjustment to somatic illness[3], and even increased risk of non-suicidal death.[4]

Diabetes mellitus is an important health condition for the aging population with at least 20% of patients over the age of 65 years have diabetes, and this number are expected to grow rapidly in the coming decades.[5,6] It is a major global public health problem which is increasing dramatically in developing countries.[7] Several studies have shown that population with diabetes mellitus have a higher prevalence of depression than normal populations.[8] A meta-analysis done found that the prevalence of major depression in patients with diabetes was 11%.[9]

There are a few studies done in Malaysia which have looked into factors linked to depression in patients with diabetes mellitus. A study on depression among patients with type 2 diabetes mellitus involving north-east coast Malaysia concluded that depression is a common condition associated with diabetes mellitus and it is related to the presence of diabetes complication.[9] In

addition, a study in west Peninsular revealed that females, Asian Indians, marital status, duration of diabetes and current alcohol consumption were among significant predictors of depression in patients with diabetes mellitus.[10]

However, to date, not many studies have describe prevalence of depression in patients with type 2 diabetes mellitus in east coast Malaysia. Thus, the aim of this study is to determine the prevalence of depression and the factors associated with it among patients with type 2 diabetes mellitus in east coast Malaysia.

METHODS
Population and setting
This was a cross-sectional study among 103 patients with type 2 diabetes mellitus attended government primary care clinic in Kuantan, Malaysia from July to August 2015. All patients attending the diabetic clinics during the study period were screened for eligibility to participate. The inclusion criteria were patient who has been diagnosed with type 2 diabetes mellitus for more than 6 months and equal or more than 18 years old. Exclusion criteria was patient with known mental disorder.

Sample Size and Sampling
Sample size was calculated using the Sample Size Calculator for Prevalence Studies from Open Epi Software. Based on 80% study power, Type I error of 0.05, design effect of 1, non-response of 10%, a sample size of 100 was required. Systematic random sampling method was used where subjects were approached based on the ratio of 1 in 5 from the registration list in which every 5th member of the sampling frame was selected to participate in the study. Eligible patients were then approached for written consent for the study. Prior to obtaining consent, all potential respondents were explained about the purpose of the study and the relevant procedures involved.

Ethical Issues
Ethical approval for the study was obtained from the IIUM Research Ethics Committee. Permission to conduct the study was also obtained from the State Health Directors as well as Medical and Health Officers in charge of the clinics prior to commencement of the study. Once the participants completed the questionnaire, the investigators reviewed and summed up the score immediately, those who scored 5 or more were referred to the doctor in charge in the clinic for further assessment of the depression symptoms and further management accordingly.

Instruments
The questionnaire used in this study comprised of two parts. The first part encompassed the demographic and clinical characteristics of the participants. The second part assessed depression symptoms using a self-administered short version of the Depression, Anxiety and Stress Scale 21 (DASS 21). The short version has 21 items which are divided into 7 items each assessing the symptoms of depression, anxiety and stress respectively. The validated Bahasa Malaysia version of DASS 21 was used in this study[11]. Participants were asked to rate their experience on each symptom over the past one week on a 4-point severity scale ranging from 0 (does not apply to me), to 3 (applies to me most or all of the time). The scores were summed up and the total scores categorized as normal, mild, moderate, severe and extremely severe according to the DASS Manual.

Data Analysis
Statistical analysis was done using Statistical Package for Social Science (SPSS) Version 20. The data were cleaned and checked for accuracy. Pearson's $\chi2$ test was used to test for association between two categorical data. Test of normality was performed for continuous data. Univariate statistics such as mean values, frequencies and proportion percentages were derived for continuous and categorical variables respectively. To test for association between depression and sociodemographic data, those who had normal score (0-4) were considered as not depressed group and those who had score of 5 and above were categorized as group with depression. Multiple logistic regression was used to measure the strength of association between the variables in the study and identify predictors for the outcomes of interest respectively. The level of significance was set as $p < 0.05$. Odds ratios (OR) along with 95% confidence levels (CI) were derived where appropriate.

RESULTS
Table 1. Socio-demographic profile of participants

Demographic characteristic (n=103)	Freq (n)	Percentage (%)
Mean age ± standard deviation (years)*	58.0±8.4	8.7
Gender		
Male	51	49.5
Female	52	50.5
Ethnicity		
Malay	81	78.6
Chinese	17	16.5
Indian	4	3.9
Others	1	1.0
Marital Status		

Single	1	1.0
Married	99	96.1
Divorced/Separated/Widowed	3	2.9
Education		
No or Informal Education	6	5.8
Primary School	24	23.3
Secondary School	55	53.4
Tertiary Level	18	17.5
Occupation		
Government Sector	19	18.4
Private sector	11	10.7
Retired/Pension	33	32.0
Not working/self-employed	40	38.8
Monthly Household Income (RM)		
<1500	48	46.6
≥1500	55	53.4
Duration of DM (years)		
<2	14	13.6
≥2	89	86.4
Medication		
Oral	72	69.9
Insulin	5	4.9
Mix	26	25.2
HbA1C		
< 6.5	28	27.2
≥ 6.5	75	72.8
Diabetic complications		
Yes	28	27.2
No	75	72.8
Co-morbidity		
Yes	72	69.9
No	31	30.1
Recent Significant Life Event		
Yes	15	14.6
No	88	85.4
Family History of psychiatric Illness		
Yes	3	2.9
No	100	97.1
Smoking		
Yes	12	11.7
No	91	88.3

Socio-demographic characteristics of respondent
Table 1 shows the socio-demographic characteristics of the participants. The mean age was 58.1 years old. Almost all of the participants is married (96.1%) where others were divorced (2.9%) and single (1.0%). The majority of the respondents had formal education (94.2%) with most of them (53.4%) had at least completed secondary school.

Medical characteristics of the respondents
Majority of the participants (86.4%) had diabetes mellitus type 2 more or equal to 2 years. 69.9 % of the participants taking oral medication, 4.9% taking insulin and 25.2% had mixture of oral and insulin medication. 72.8% participants had uncontrolled diabetes mellitus (HbA1C $\geq$ 6.5%) 69.9% had co-morbidity. Among the participants, only 14.6% had recent significant life event, 2.9% had family history of psychiatric illness and 11.7% was smoking.

Table 2: Grading and prevalence of depression.

Grading of depression (cut-off score) n= 103	Participants	
	No	Percentage (%)
Normal	90	87.4
Mild	5	4.9
Moderate	5	4.9
Severe	3	2.9
Extremely severe	0	0
Total prevalence of depression (13/103 = 12.6%)		

Table 3: Association between socio-demographic profile and depression status.

Variables	Depression n(%)	Non-depression n(%)	p-value
Total(103)			
Age (years)*	58.6(11.2)	57.9(8.4)	0.79
Gender			
Male	2(3.9)	49(96.1)	**0.008**
Female	11(21.2)	41(78.8)	
Ethnicity			
Malay	11(13.6)	70(86.4)	0.631
Chinese	1(5.9)	16(94.1)	
Indian	1(25.0)	3(75.0)	
Others	0(0.0)	1(100.0)	
Marital Status			
Single	0(0.0)	1(100.0)	0.515
Married	12(12.1)	87(87.9)	
Divorced/Separated/Widowed	1(33.3)	2(66.7)	
Education			
No or Informal Education	3(50.0)	3(50.0)	0.117
Primary School	3(12.5)	21(87.5)	
Secondary School	5(9.1)	50(90.9)	
Tertiary Level	2(11.1)	16(88.9)	
Occupation			
Government Sector	1(5.3)	18(94.7)	0.485
Private sector	0(0.0)	11(100.0)	
Retired/Pension	5(15.2)	28(84.8)	
Not working/self-employed	7(17.5)	33(82.5)	
Monthly Household Income (RM)			
<1500	9(18.8)	39(81.3)	0.080
≥1500	4(7.3)	51(92.7)	
Duration of DM (years)			
<2	2(14.3)	12(85.7)	
≥2	11(12.4)	78(87.6)	
Medication			
Oral	8(11.1)	64(88.9)	0.184
Insulin	2(40.0)	3(60.0)	
Mix	3(11.5)	23(88.5)	
HbA1C			
< 6.5	3(10.7)	25(89.3)	1.000
≥ 6.5	10(13.3)	65(86.7)	
Diabetic complications			
Yes	6(21.4)	22(78.6)	0.178
No	7(9.3)	68(90.7)	
Co-morbidity			
Yes	12(16.7)	60(83.3)	0.102
No	1(3.2)	30(96.8)	
Recent Significant Life Event			
Yes	5(33.3)	10(66.7)	**0.021**
No	8(9.1)	80(90.9)	

Family History of psychiatric Illness			
Yes	1(33.3)	2(66.7)	0.336
No	12(12.0)	88(88.0)	
Smoking			
Yes	1(8.3)	11(91.7)	1.000
No	12(13.2)	79(86.8)	

*Result in means and standard deviation

Prevalence of depression
Table 2 shows the prevalence of depression among patients with type 2 diabetes mellitus in this study was 12.6% with 3% of them were categorized as severe depression. Table 3 shows only gender and recent significant life event were significantly associated with depression with p value of 0.008 and 0.021 respectively.

Table 4: Multiple logistic regression analysis of significant variables with their relation to depression among patients with type 2 diabetes mellitus.

Variables	Adjusted odd ratio	p-value
Gender		
Male	0.17	**0.008**
Female	1	
Recent Significant Life Event (within 6 months)		
Yes	4.24	**0.021**
No	1	

Table 4 shows that the predictors for depression among adult with type 2 diabetes were gender and recent significant life event within 6 months. Compared to women, men were less likely to get depression. (OR: 0.17). Those with recent significant life event within 6 months were more likely to have depression compared to those without recent significant life event (OR: 4.24)

DISCUSSION
This study showed that the prevalence of depression among patients with type 2 diabetes mellitus in east coast Malaysia was 12.6%. This result is almost equivalent to the previous two studies done in north-east coast (12.3%) and west peninsular Malaysia (11.5%)[9,10] This may means that the prevalence of depression in patients with type 2 diabetes mellitus in Malaysia can be estimated around that figure and the prevalence is probably not much different across the country.

Our study revealed that gender and recent significant life events were the significant predictors of depression. These findings were consistent with a study which also found that sex is significantly associated with depression and women with type 2 diabetes mellitus had higher risk of depression compared to men.[8] A local study done in west peninsular Malaysia also revealed that female patients have a higher prevalence of depression compared to males. Many factors have been implicated for this gender difference including biological, socio-cultural and difference in responsibility burden.[12] Regardless of all these factors, we should be aware of these consistent results from several studies locally as well as abroad and more female patients with diabetes mellitus should be screened for symptoms of depression.

It is not surprising that recent life event was among the significant predictors for depression in our patient as it may give the psychological impact to the patient that will lead to change in their emotion and the way of thinking. It was also found that recent significant life event may lead to increase in stress level and this may subsequently leads to depression.[10]

Various social factors had been associated with depression among patients with type 2 diabetes mellitus. Age, gender, race, marital status, level of education and occupation were the factors most frequently cited with its occurrence.[13] A local study meanwhile reported that sex, ethnicity, mental status, duration of diabetes mellitus and family history with psychiatric illness were among the predictors for depression in patients with diabetes mellitus.[10] However, our study failed to show any significant association between all these factors. This could be due to the relatively small sample size of our study compared to the previous study.

Our study also looked at the association between diabetes control with depression. We took HbA1c cut point of 6.5% as suggested by Malaysian Clinical Practice Guidelines. However, we failed to see any significant association between HbA1c and depression. Our study also did not found any significant association between depression and their co morbidity.

Depression is recognized to be associated with chronic disease and nonpsychiatric medical illness. Due to increasing rates of depression in this group of patients, it is important for us to screen them as early and as many as possible. We also need to plan a proper mental services for patients with diabetes mellitus. Furthermore, early detection and treatment of depression may lead to improvement in glycemic control.[14] In patients with diabetes mellitus, depression has been associated with worsened glycaemic control[14,15], non-adherence to

treatment[16] and increased risk of vascular complications including sexual dysfunction, diabetic retinopathy, nephropathy, neuropathy and macrovascular complications.[17] All this findings highlighted the importance of early detection of depression in patients with diabetes mellitus.

CONCLUSION
Depression is a common condition associated with diabetes mellitus and it has a huge implication on the management of diabetes. Health care personnel should therefore take the initiative to screen this condition at any given opportunity especially among female patients and patients with recent significant life event. Better outcome in patients' overall care and quality of life may be achieved by managing both the depression and diabetes concurrently.

Declaration
The authors declared no conflicts of interest in this study

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