Afr. J. Med. Med. Sci. (2021) **50,** 155-163

Depression and anxiety among patients with type 2 diabetes mellitus in Ibadan, Oyo State

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Abstract

Background: The psychosocial burden of Diabetes Mellitus (DM) and its debilitating consequences could result in depression and anxiety. Several studies had been conducted on depression alone among diabetics in Nigeria. However, only few studies in addition to depression have explored the prevalence of anxiety and anxiety comorbidity with depression.

Aim: To determine the prevalence and factors associated with anxiety or depression among Type 2 DM patients.

Methods: This was a hospital based cross-sectional survey. Systematic random technique was used to select 273 Type 2DM patients aged 40 years and above attending a secondary health facility in Ibadan, Nigeria. Depression and anxiety were assessed by using Zung's Self Depression Rating Scale and Beck Anxiety Inventory respectively. Data was analyzed using the Chi square test and multivariate logistic regression with a P value set at 0.05.

Results: The mean age of the respondents was 62.1 (±10.2) years and majority were female (85.3%). The prevalence of depression, anxiety and comorbidity of depression and anxiety were 27.5%, 16.5% and 4.4% respectively. Physical inactivity and uncontrolled blood glucose were found among 48.4% and 61.5% respondents respectively. Depression was significantly associated with physical inactivity [OR=0.58; 95% CI=0.34-0.93] and low-moderate social support [OR=1.85; 95% CI=1.08-3.17], while anxiety was significantly associated with religion. The predictors of depression and anxiety were low social support (OR=0.58; 95% CI=0.33-0.95 p=0.04) and Christianity (OR=2.25; 95% CI=1.10-4.61, P=0.03) respectively.

Conclusion: We recommend that clinicians should screen Type 2 DM patients for depression and anxiety, assess their level of social support, educate on the importance of physical activity and encourage physical activity.

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Keyword: *Depression, Anxiety, Type 2 Diabetes Mellitus, Comorbidity, Social support.*

Résumé

Contexte : Le fardeau psychosocial du diabète sucré (DM) et ses conséquences débilitantes pourraient entraîner la dépression et l'anxiété. Plusieurs études ont été menées sur la dépression seule chez les diabétiques au Nigeria. Cependant, seulement peu d'études en plus de la dépression ont exploré la prévalence de l'anxiété et l'anxiété comorbidité avec la dépression.

Objectif : Déterminer la prévalence et les facteurs associés à l'anxiété ou à la dépression chez les patients atteints de DM de type 2.

Méthodes : Il s'agissait d'une enquête transversale en milieu hospitalier. Une technique aléatoire systématique a été utilisée pour sélectionner 273 patients de type 2DM âgés de 40 ans et plus fréquentant un établissement de santé secondaire à Ibadan, au Nigéria. La dépression et l'anxiété ont été évaluées en utilisant l'échelle d'évaluation de l'autodéfré dépression de Zung et l'inventaire de l'anxiété Beck respectivement. Les données ont été analysées à l'aide du test chi carré et de la régression logistique multivariée avec une valeur P fixée à 0,05.

Résultats : L'âge moyen des répondants était de 62,1 ans (+10,2 ans) et la majorité était une femme (85,3 %). La prévalence de la dépression, de l'anxiété et de la comorbidité de la dépression et de l'anxiété était de 27,5 %, 16,5 % et 4,4 % respectivement. L'inactivité physique et la glycémie incontrôlée ont été trouvées parmi 48,4 % et 61,5 % des répondants respectivement. La dépression était significativement associée à l'inactivité physique [OR=0,58; IC à 95 %=0,34-0,93] et à un soutien social faiblement modéré [OR=1,85; IC à 95 %=1,08-3,17], tandis que l'anxiété était significativement associée à la religion. Les prédicteurs de la dépression et de l'anxiété étaient un faible soutien social (OR=0,58; IC à 95 %=0,33-0,95 p=0,04) et christianisme (OR=2,25; IC à 95 %=1,10-4,61, P=0,03) respectivement.

Conclusion : Nous recommandons aux cliniciens de dépister la dépression et l'anxiété chez les patients de type 2, d'évaluer leur niveau de soutien social, d'éduquer sur l'importance de l'activité physique et d'encourager l'activité physique.

Mots-clés: *Dépression, Anxiété, Diabète sucré de type 2, Comorbidité, Soutien social*.

Introduction

Diabetes Mellitus (DM) is a global health problem with increasing prevalence worldwide [1]. The global prevalence of DM among adults 18 years and above rose from 4.7% in 1980 to 8.5% in 2014 [1]. This increase was more rapid in middle and low income countries [1]. In 2015, globally, there were 415 million people with DM, of which 14.2 million resided in Africa [2]. More than 1.56 million cases were reported in Nigeria [2]. The increasing prevalence of DM in low income countries is attributed to changes in diet and lifestyle, urbanization, shift to sedentary lifestyle and improved disease awareness [1,3].

DM is associated with severe complications such as blindness, kidney failure, ischaemic heart disease, stroke and lower limb amputation [1]. Thus, it is not surprising that the psychosocial burden of having a chronic disease like DM, the high cost of its treatment, and the burden associated with living with its debilitating consequences could result in depression and anxiety among patients. Hence, the complex interaction of social, psychological and biological factors may result in depression or anxiety [4,5].

The relationship between DM and depression is bi-directional. Depression and anxiety are known to increase inflammatory and platelet aggregation responses and decrease insulin sensitivity, thereby contributing to poor glycaemic control and increasing the risk of complications. In addition, depressed and anxious individuals are less likely to comply with DM self-care recommendations and more likely to follow sedentary lifestyles, remain physically inactive, indulge in smoking and unhealthy diet eventually leading to poor diabetes control and clinical outcomes [5,6,7,8,]. Despite the frequent occurrence of depression and anxiety among people with DM, prevalence and factors associated with anxiety have not been adequately studied in Nigeria as most studies focused on depression alone. Studies in high income countries have found that depression and anxiety occur more in persons with DM compared to the general population [9,10]. One in six diabetic patients has depression which often coexists with anxiety [11]. Unfortunately, the coexistence of depression and anxiety in patients with DM results in decreased life satisfaction, poor quality of life and an increase health-care utilization and cost [12].

Several validated, easy-to-administer tools are available to facilitate diagnosis of depression and anxiety among diabetic patients. However, these are not routinely used by clinicians, therefore, these disorders remain under-diagnosed and untreated [13]. There are several studies on depression alone among diabetic patients but there are only few studies on anxiety and prevalence of depression plus anxiety comorbidity in Nigeria. This study will provide information that will guide the clinicians' practice for DM patients. The information obtained will also support the content of health education interventions, treatment plans and case management of patients and thereby improve treatment outcomes. Hence, we determined the prevalence and factors associated with depression or anxiety among Type 2 DM patients in Ibadan, Nigeria.

Materials and methods

Study Setting and Study Population: The study was carried out at the Medical Outpatients' Clinic of the Jericho Specialist Hospital (JSH), Ibadan, Oyo State in Nigeria. Ibadan is the capital city of Oyo State. JSH is a public health facility and it is owned by Oyo state Hospital Management Board. It is a 30-bedded secondary health care level hospital managed by family physicians. It provides in-patient and out-patient services, in addition, emergencies and accidents cases are treated. The Medical outpatient (MOP) clinic generally manages patients with chronic medical illness. There are two clinic days in each week at the MOP clinic. An average of 3 new and 290 old patients with DM are managed each month at the MOP clinic. The study population were patients 40years and above with a diagnosis of Type 2 DM and who had been receiving care at the MOP for at least 3months (to rule out adjustment disorder).

Study Design, Sample Size and Sampling Technique: The study design was a cross-sectional survey. A minimum sample size of 246 was obtained using the formula for single proportion with the following assumptions: - confidence interval of 95%, prevalence of depression of 20% was reported among diabetic patients in Ile-Ife, Osun State, Nigeria [14] and with precision level set at 5%. After adjusting for non-response, a sample size of 273 patients was obtained and were interviewed. Participants were recruited using systematic random sampling technique and data was collected from August 1 to September 30, 2017

Data Collection Instrument: Data collection was with the use of an interviewer-administered semi-structured questionnaire and the findings on physical examination. Depression was assessed using Zung's Self Rating Depression Scale (ZSDS) [15]. The scale is a 20-item 4-point Likert scale that assesses affective, psychological and somatic symptoms of depression. The maximum obtained score is 80, while the minimum obtained score is 20. It has been validated and used in other studies in Nigeria [14,15,16].

Anxiety was assessed using Beck Anxiety Inventory (BAI) [17]. BAI is a 21 item instrument with a 4-point likert scale that obtained information on emotional, psychological and cognitive anxiety symptoms of patients. Each question has a value that range between 0 and 3. The maximum obtained score is 0, while the minimum obtained score is 63. The BAI has high internal consistency (Cronbach's á = 0.92) and a test-retest reliability of 0.75 over a period of a week. BAI had also been validated and used in other studies in Nigeria [11,17].

The Perceived Social Support of respondents was assessed using Multidimensional Scale of Perceived Social Support (MSPSS) [18]. MSPSS is a 12-item instrument with a 7-point Likert-type scale with three social support subscales namely, family (FA), friends (FR) and significant others (SO). The items on the MSPSS had good internal consistency (Cronbach's alpha = 0.84–0.92) and strong test-retest reliability (r = 0.72–0.85) [18]. MSPSS had also been validated and used in Nigeria [19].

Study Variables: The dependent variables were depression (present/absent) and anxiety (present/absent).

The independent variables were respondents' socio-demographic (age, sex, marital status employment status, level of education, average monthly income), medical (duration of DM, blood pressure control, blood glucose control, presence of comorbidity, body mass index) and psycho-social factors (social support, physical activity).

Operational Definitions:
A respondent was categorized as depressed if he/she had a score of 50 or more on a scale of 20 to 80 [15] and anxious if he/she had a score of 16 or more on a scale of 0 to 63 [17].

A respondent was categorized as living below or above poverty line if his/her average monthly income was below or above $1.90/day respectively, which is equivalent to ₦18,500 per month [20]. Physical activity was defined as having at least 30 minutes of exercise each day for five or more days of the last week.

Controlled blood glucose was fasting blood glucose less than or equal to 110mg/dl and uncontrolled blood glucose was fasting blood glucose greater than or equal to 110mg/dl. Underweight was body mass index (BMI) less than 18.50kg/m^2, normal weight was BMI between 18.5kg/m^2 and 24.99kg/m^2, overweight with BMI greater than or equal to 25kg/m^2 and obesity with a BMI greater than or equal to 30kg/m^2.

Data Analysis: Depression was categorized into two, no depression and depression present based on the respondents' depression scores. Anxiety was also categorized into two; no anxiety and anxiety present, based on the respondents' anxiety scores. Social support (SS) was categorized into 3 namely, high, moderate and low based on the respondents' MPSS scores. A mean total scale score of >5.1 - 7 denoted high SS, a score 3-5 was moderate SS and a score of 1-<3 is low SS.

Data was analyzed using the Statistical Package for Social Sciences (SPSS) version 17. Descriptive statistics was used to summarize quantitative variables, while categorical variables were summarized in proportions. The Chi-square test was used to test for association between categorical variables. Multivariate logistic regression was used to identify factors influencing DM patients having depression or anxiety, and adjust for the effect of confounders. Regression model for depression was built by modeling the factors that were significant from bivariate analysis, while the variable significant on the chi square analysis and some important known associated factors were put into the logistic regression model using the enter method for anxiety. All analysis was done at 5% level of significance.

Ethical Considerations: Ethical approval was obtained from the Ethical Review Committee (AD13/479/ 511) of the Oyo State, Ministry of Health. Permission to carry out the study was obtained from the Chief Medical Consultant, Jericho Specialist Hospital, Ibadan. Informed consent was obtained from each participant prior to data collection. Respondents' participation was voluntary and refusal to participate did not affect care. Confidentiality of the information given was ensured.

Results

The profile of the respondents is shown in Table 1. The mean age of the respondents was 62.1+10.2

Table 1: Respondents Profile

Variable	Frequency (N)	Percentage (%)
Age (years)		
40-49	28	10.3
50-59	88	32.2
60 and above	157	57.5
Sex		
Male	40	14.7
Female	233	85.3
Marital status		
Married	187	68.5
Widowed	74	27.1
Others (divorced, single)	12	4.4
Religion		
Christianity	162	59.3
Islam	111	40.7
Employment status		
Currently employed	191	70.0
Unemployed	35	12.8
Retired	47	17.2
Level of education		
No formal education	59	21.6
Primary	100	36.6
Secondary	68	24.9
Post-secondary	46	16.9
*Monthly income**		
<₦18,500	184	67.4
≥₦18,500	89	32.6
Duration of illness (years)		
<5	138	50.6
5 - 9	71	26.0
>9	64	23.4
Median of duration =4 (0.4-15)years		
Social Support		
Low	18	6.6
Moderate	153	56.0
High	102	37.4
Presence of co-morbidity		
None	29	10.6
1 or 2	150	55.0
3 or >	94	34.4
Physical activity		
Yes	105	38.5
No	168	61.5
Blood glucose control status		
Controlled (FBG<110mg/dl)	141	51.6
Uncontrolled (FBG>110mg/dl)	132	48.4
Body Mass Index		
Underweight	3	1.1
Normal weight	73	26.7
Over weight	118	43.3
Obese	79	28.9

** Poverty line was earning < $1.90/day*

years. More than half of the respondents (57.5%) were 60 years and above. Majority were females (85.3%) and most were married (68.5%). Seventy-eight percent four of the respondents (78.4%) had formal education, 70.0% were currently employed and 67.4% were living below the poverty line.

Respondents who had Type 2 DM for less than five years were 50.5%. Majority of the respondents (89.4%) had co-morbidities, the commonest comorbidity was hypertension (79.5%). One hundred and two (37.4%) respondents had high level of social support, 61.5% were physically inactive and 48.4% of the respondents had uncontrolled blood glucose. Seventy-nine percent of the respondents were obese, while 43.3% were overweight.

Table 2 shows the prevalence of depression and anxiety among the respondents. The prevalence of depression was 27.5%, Of this group, 13.3% were males while 86.7% were females. The prevalence of anxiety among the respondents was 16.5% and was slightly higher (17.5%) among males compared to females (16.3%). The prevalence of comorbid depression and anxiety among respondents as shown in table 3 was 4.4%.

Table 4 shows the association between depression with some of the respondents' characteristics and factors influencing depression. A higher proportion of respondents that were 60 years and above (58.7%) had depression compared with to those who were less than 60 years (41.3%) [OR=1.07; 95%CI=0.63-1.83]. A higher proportion of respondents who had depression were female (86.7% vs 13.3%) [OR=1.16; 95%CI=0.54-2.51]. Also, among the respondents with depression, 92.0% and 76.0% had co morbidities and abnormal BMI respectively compared to 8.0% and 24.0% without co morbidities and normal BMI respectively. However, these associations were not statistically significant. There was no significant association between depression and uncontrolled blood glucose ([OR=1.06; 95%CI=0.62-1.80].

Factors found to be significantly associated with depression were physical activity and social support. A higher proportion of respondents who had depression were physically inactive (52.0%) compared to those who were physically active (48.0%) [OR=0.58; 95%CI=0.34-0.93]. Among respondents that had depression there was higher proportion of respondents with low/moderate social support (52.0%) compared to those who had high social support (48.0%). [OR=1.85; 95%CI=1.08-3.17]. Variables significant in the chi square analysis

Table 2: Prevalence of Depression and Anxiety among the Respondents (N=273)

Variable	Frequency (n)	Percent (%)
Depression	75	27.5
Males	10	25.0
Females	65	27. 9
Anxiety	45	16.5
Males	7	17.5
Females	38	16.3

Table 3: Prevalence of depression and anxiety co-morbidity among Respondents

Variables	Anxiety No n (%)	Yes n (%)	Totaln (%)
Depression			
No	165 (60.4)	33 (12.1)	198 (72.5)
Yes	63 (23.1)	12 (4.4)	75 (27.5)
Total	288 (83.5)	5(16.5)	273 (100.0)

Table 4: Factors influencing occurrence of depression among the respondents

Variables	No Depression n=198(%)	Depression Present n=75(%)	Crude Odd ratio	95% Confidence interval	Adjusted Odd ratio	95% Confidence interval	P-value
Age (years)							
<60	85 (42.9)	31 (41.3)	1.07	0.63-1.83			
60 and above	113 (57.1)	44 (58.7)					
Sex							
Male	30 (15.2)	10 (13.3)	1.16	0.53-2.51			
Female	168 (84.8)	65 (86.7)					
Marital Status							
Currently married	137 (69.2)	50 (66.7)	1.12	0.64-1.98			
Not currently married	61 (30.8)	25 (33.3)					
Religion							
Christianity	111 (56.1)	51 (68.0)	0.60	0.34-1.05			
Islam	87 (43.9)	24 (32.0)					
DM Duration							
< 5 years	101 (51.0)	37 (49.3)	1.069	0.63-1.82			
≥5 years	97 (49.0)	38 (30.7)					
Co-morbidity							
Yes	175 (88.4)	69 (92.0)	1.51	0.59-3.87			
No	23 (11.6)	6 (8.0)					
Fasting glucose							
Controlled	103 (52.0)	38 (50.7)	1.06	0.62-1.80			
Uncontrolled	95 (48.0)	37 (49.3)					
Body mass index							
Normal	55 (27.8)	18 (24.0)	0.82	0.44-1.52			
Abnormal	143 (72.2)	57 (76.0)					
Physical inactivity							
Yes	129 (65.2)	39 (52.0)	0.58	0.34-0.93	1.61	0.83-2.78	0.09
No	69 (34.8)	36 (48.0)			1		
Social Support							
High	66 (33.3)	36 (48.0)	1.85	1.08-3.17	0.58	0.33-0.95	0.04*
Low/moderate	132 (66.7)	39 (52.0)			1		

**Significant at p<0.05*

Table 5: Factors influencing occurrence of anxiety among the respondents

Variables	No Anxiety n=198 (%)	Anxiety Present n=75 (%)	Crude Odd ratio	95% Confidence interval	Adjusted Odd ratio	95% Confidence interval	p-value
Age (years)							
<60	95 (41.7)	21 (46.7)	0.19	0.43-1.55	1.33	0.65-2.69	0.44
60 and above	133 (58.3)	24 (53.3)			1		
Sex							
Male	33 (14.5)	7 (15.6)	0.92	0.38-2.23	0.99	0.41-2.46	0.98
Female	195 (85.5)	38 (84.4)			1		
Marital Status							
Currently married	159 (69.7)	28 (62.2)	1.42	0.719-2.72			
Not currently married	69 (30.3)	17 (37.8)					
Religion							
Christianity	129 (56.6)	33 (73.3)	0.47	0.23-0.96	2.25	1.10-4.61	0.03*
Islam	99 (43.4)	12 (26.7)			1		
DM Duration							
< 5 years	118 (51.8)	20 (44.4)	1.34	0.71-2.55			
≥5 years	110 (48.2)	25 (55.6)					
Co-morbidity							
Yes	202 (88.6)	42 (93.3)	1.80	0.52-6.23			
No	26 (11.4)	3 (6.7)					
Fasting glucose							
Controlled	121 (53.1)	20 (44.4)	1.41	0.74-2.69			
Uncontrolled	107 (46.9)	25 (55.6)					
Body mass index							
Normal	62 (27.2)	11 (24.2)	0.87	0.41-1.82			
Abnormal	166 (72.8)	34 (75.6)					
Physical inactivity							
Yes	141 (61.8)	27 (60.0)	0.93	0.48-1.78			
No	87 (38.2)	18 (40.0)					
Social Support							
High	82 (36.0)	20 (44.4)	1.42	0.75-2.72			
Low/moderate	146 (64.0)	25 (55.6)					

Significant at p<0.05

were put into the logistic regression model using the enter method. Respondents who had high level of perceived social support were 1.7 times less likely to have depression compared to those who had low/ moderate level of perceived social support (OR=0.58; 95%CI=0.33-0.95).

Regarding association between anxiety and some of the respondents' characteristics, only religion was significantly associated (Table 5). A higher proportion of respondents who had anxiety were Christian (73.3%) compared to those who were Muslim (6.7%) [OR=0.47; 95%CI=0.23-0.96]. There was no significant association between anxiety and uncontrolled blood glucose [OR=1.41; 95%CI=0.74-2.69].

Logistic regression of variables for anxiety among respondents showed that respondents who were Christians were 2 times more likely to have anxiety compared to Muslim (OR=2.25; 95%CI=1.10-4.61).

Discussion

In this study we determined the prevalence and factors associated with depression and anxiety among patients with type 2 DM. This study showed that considerably high proportion of patients with type 2 DM had depression and anxiety. Depression and anxiety were significantly associated with social support and religion respectively.

Nearly one third of the respondents had depression. This is consistent with the finding that depression affects up to one-third of people with DM [6]. The chronic psychological burden of DM

diagnosis, burden of self-care behaviours, and risk of diabetic complications may lead to emotional distress, resulting in a depressive state. A meta-analysis found an increased risk of depression in patients who were diagnosed with DM compared with patients who had DM, but were unaware of their diagnosis suggesting that the knowledge of the condition and the burden increased the rate of depression [21]. The high proportion of DM patients with depression is a cause for concern because of its enormous burden on the individual, family and the society. This may increase the risk of mortality, increase the risk of other comorbidities, reduce life expectancy, decrease quality of life, lead to loss of productivity, increase health-care utilization and cost. Thus, there is urgent need for intervention that will reduce DM consequences by addressing risk factors such as physical inactivity and low social support.

The prevalence of anxiety in this study was consistent with the finding (18.2%) among patients with DM in Ethiopia [11]. However, the prevalence of anxiety we found was lower than that reported earlier (20.0%) among patients with DM at Ile-Ife, Nigeria [14]. Anxiety may be due to undesirable lifestyle changes, poor metabolic outcomes and fear of the complications of DM [5]. Comorbid anxiety is of clinical importance to people with DM because it has been shown to be associated with poor glycaemic control [22].

The prevalence rate of comorbid depression and anxiety in this study was lower than what was found among DM patients in Northern India (21%) and Ile–Ife Nigeria (9%) [9,14]. The Beck Anxiety Inventory tool used in this present study is able to differentiate between anxiety and depression unlike other studies. Comorbid depression and anxiety could be due to shared genetic risk factors or stressful life events. Also, the symptoms of anxiety and depression overlap, hence both conditions can be diagnosed even when only one exists in a patient. Additionally, depression and anxiety symptoms are associated with the stimulation of the hypothalamic-pituitary-adrenal axis by psychological stress which DM patients experience [5,6,7,8]. Comorbid depression and anxiety among DM patients results in more severe illness and poor quality of life [14]. Therefore, it is necessary to detect, confirm, and treat depression and anxiety in patients with Type 2 DM in order to improve health outcomes.

We found that respondents who had depression were more physically inactive and this is consistent with other studies [23,24]. The protective effect of physical activity on the development depression in diabetic patients had been reported [23,24]. In a review of studies by Lysy et al., it was found that adults with Type 2 DM who are physically inactive were 1.72 to 1.75 times more likely to be depressed than those who were physically active [24]. Physical activity causes the release of neurotransmitters such as endorphin and serotonin which boost mood. Regular physical activity is important in the control of blood glucose by regulating peripheral blood sugar uptake, increasing insulin receptor sensitivity thereby reducing the burden of DM. Also, it helps in the control of body weight as obesity increases the risk of complication that could predispose to depression among DM [24,25,26].

Studies have shown that social support is important in the management of DM for achieving good glycaemic control [19,27]. In this study diabetics with low-moderate support had depression compared to those who had high social support. This is consistent with the finding by Zang et al, in China, in which social support was identified as a protective factor against depression among diabetic patients [27].

In this study, more respondents who had anxiety disorder were Christians compared to those who were Muslims. This finding could be because the data collection was immediately after the Ramadan fast, when generally, Muslims are optimistic about their well-being [28]. Amin et al, also found that anxiety scores were significantly lower during the Ramadan fast when compared with the scores before the Ramadan fast [29].

This study was able to provide baseline information on the prevalence of depression, anxiety and the comorbidity of anxiety and depression among patients with type 2 DM in Ibadan, Nigeria as standardized instruments were used for the assessment. Hence, this study can inform the practice of clinicians and will serve as a guide for the development of interventions for DM patients in Nigeria.

There are limitations in this study which should be acknowledged. This study was a hospital-based survey therefore, the results may not be a reflection of the true situation among the general populace. Secondly, this study was a cross-sectional survey hence the observed associations may not be causal.

Conclusion

Depression and anxiety were common among type 2 DM patients attending Jericho Specialist Hospital,

Ibadan. However, the prevalence of comorbid depression and anxiety was low. To provide holistic care for patients with type 2 DM, physicians should screen DM patients for depression, anxiety and also their level of perceived social support should be assessed.

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Received = 6th November 2017
Accepted =29th July 2020