PREVALENCE OF DEPRESSION AMONG A SAMPLE OF PATIENTS WITH TYPE II DIABETESMELLITUS

DONIA KREIT ALI, MBCHB ∗
KARWAN HAWEZ SULAIMAN, MBCHB, IBMS (Family Med.)∗∗
RAGIB HASAN SANAAN, MBCHB, MSC, BFM (Family Med.)∗∗∗

ABSTRACT

Background: Diabetes is one of the largest global health emergencies of the 21st century and depression is commonly found as a co morbid condition in chronic medical illnesses. Patients with diabetes are twice as likely to suffer from depression compared to the general population. The predictors of depression in a sample of Iraqi Patients with type 2 Diabetes were examined and evaluated in the present study.

Subject and Methods: In the current cross-sectional study, 254 patients diagnosed with type 2 diabetes were invited from three diabetes centers in Duhok city in Iraqi Kurdistan between June 2017 and February 2018. The presence of depression was measured by Beck Depression Inventory (BDI-II) scale.

Results: The agerange of the patients was (33-90 years) with a mean age of 55.07±9.67 years The study sample comprised a total of 254 patients with equal number of both genders and had disease forth last 9.96 years. The mean BMI was 27.4. More than 72.4% of the patients had uncontrolled blood glucose. The most prevalent co morbidity in patients was hypertension (54.3%), dyslipidemia (61%), overweight and obesity(75.2%). A small percentage of the patients was on insulin (22.8%) and smoker (12.2%). The prevalence of clinical depression (BDI >16 scores) among patients was 70.9% with mean score 22.29. The study showed that aging,female gender, and having dyslipidemia as predictors of depression in the study sample.

Conclusions: The study showed that more than two thirds of the included patients had depression, most of them having mild to moderate level. Being older, female gender, and having dyslipidemia were shown to be predictors of depression in type 2 diabetic patients.

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Keywords: Depression, type ii diabetesmellitus, Duhok city.

A ccording to the International Diabetes Federation, "diabetes is one of the largest global health emergencies of the 21st century". The prevalence rates of diabetes and the estimated impaired glucose tolerations were one in 11 and one in 15 adults across the world, respectively. It is expected that these numbers be increased dramatically, in particular among people living in urban areas resulting in more medical and economic issues. It is projected that this increase will add on top of 12% to the total expenditure spending on diabetes [1]. The total number of persons affected by diabetes were 561000 and 678000 in Iraq in 1995 and 2000, respectively and it is projected to reach 1,739,000 by 2025 [2].

∗ Family medicine physician, Kurdistan Board Family.
∗∗ Family Medicine Consultant; Kurdistan board for medical Specialties, Iraq.
∗∗∗Lecturer, Department of Community and Family Medicine, College of Medicine, University of Duhok, Kurdistan Region, Iraq.

Depression as a very serious disease is common with a lifetime prevalence between 11% in low-income countries and 15% in high-income countries[3]. The lifetime risk of a mental health issue is 50% with a considerable drop in employment and productivity[4]. Depression and anxiety are considered to be the 4th cause and diabetes as the 8th cause of disability-adjusted life years in high-income countries [5].

According to American Psychiatric Association Diagnostic and Statistical Manual of Mental Disorders (DSM-5); depressionsdefined as a mood disorder reuniting several symptoms resulting in alteration of individual functionality. Depression disturbs emotions, cognition, and behaviors[6]. According to DSM-5; depression is described as a first episode, a recurrent or chronic episode; can be mild, moderate or severe, with or without psychotic manifestations.

It has been documented that prevalence of depression is moderately raised in pre-diabetic patients and in undiagnosed diabetic patients. In addition, it is increased in patients previously diagnosed with diabetes compared to healthy subjects [7] and it is possible to be twice as high in type 2 diabetic patients in comparison with general populations across the world[8].

The prognosis of diabetes worsens with depression and anxiety presence and it can increase the non-adherence to the medications[9], lower the health-related quality of life,[10]. In addition, the risk of type 2 diabetes mellitus development is increased by 60%[11].

It appears that diabetes and depression has a bidirectional association between each other, a complex association sharing biological mechanisms, whose understanding provide a better treatment and improve the pathological outcomes[12].

The recent literature reviews have reported three directions for the relations of depression and diabetes: possible common etiology; increase the risk of future depression by diabetes; and increase risk of future diabetes by depression[13].

The purpose of this cross-sectional study was to show the connections between depression and diabetes and point out the importance of identifying depression in diabetic patients.

PATIENTS AND METHODS

Study Design and sampling

In the current cross-sectional study, a total of 254 patients previously diagnosed with type 2 diabetes mellitus were invited to participate in the study. The patients were selected from those patients reporting to the three diabetes centers across Duhok city in Iraq between 1st June 2017 and 31th, January 2018. The diabetes centers were Duhok Diabetes Center, Avrocity Family Medicine Center, and Zanist Family Medicine Center.

The patients met eligibility criteria if they were male or females, aged 18 years and older with adequate cognitive and mental functions. The pregnant women, those with secondary diabetes including iatrogenic diabetes (steroid therapy) pancreatic disease (chronic pancreatitis, cystic fibrosis); known endocrine cause of diabetes (hypercortisolism or acromegaly); and those with severe diseases expectancy were not included in the study.

Diagnostic and measurement criteria

The diagnosis of the type 2 diabetes was established when HbA1cis greater than or equal to 6.5% according to American Diabetes Association guidelines [14].The HbA1c> 7% was considered as uncontrolled and ≤7% as controlled diabetes.

Patients' data, including socio-demographic characteristics and their medical conditions, were collected through face-to-face interview.

Beck Depression Inventory (BDI-II) scale was used to assess the presence of depressive symptoms, developed for subjects 13 to 80 years. The items in the scale are rated on a 4-point scale rating from 0 to 3 indicating the item severity. The maximum score is 63.The numbers given to each item are added together to obtain the overall score of the patients indicating 0-13 for minimal depression, 14-19 for mild depression, 20-28 moderate depression, and 29-63 as severe [15].

Hypertension was defined as an SBP> 140 mmHg and DBP> 90 mmHg or use of antihypertensive therapy [16].Dyslipidemia was determined in accordance with AACE guidelines [17]; total cholesterol: desirable < 200 mg/dl, Borderline high 200- 239, High > 239 mg/dl; high density lipoprotein Cholesterol: dyslipidemic Low < 40 mg/dl in males, < 50 mg/dl in females; low density lipoprotein cholesterol: optimal < 100 mg/dl, near optimal 100–129 mg/dl, borderline high 130-159 mg/dl, high 160 - 189 mg/dl, very high > 189 mg/dl. Triglyceride: normal < 150 mg/dl, high 150-199 mg/dl; hypertriglyceridemic 200 - 499 mg/dl, very high > 499 mg/dl.

Body mass index (BMI) was measured through dividing weight (Kg) by squared height (m) and the range 18.5 to 24.9 was considered as normal, 25-29.9 as overweight, and ≥ 30 as obese[18].

STATISTICAL ANALYSIS

The descriptive purposes of the study were determined through the frequency distribution. The association of two proportions was evaluated byChi-square tests. The predictors of depression in diabetes patients were determined through the univariate analyses. The significant level was considered asP-value of less than 0.05. All calculations were performed by Statistical Package for Social Sciences (SPSS, version 19).

ETHICAL CONSIDERATIONS

The ethical approval of the current investigation was obtained from the local Health Ethics Committee in Duhok-Iraq. The written consent forms were obtained from all patients prior to interview and the participation was optional. The patients were given the guarantee of confidentiality of their personal information.

RESULTS

Results

The baseline socio-demographic characteristics of patients were shown in **Table 1**. The mean age was 55.07±9.67 years (Range: 33-90) and majority were between 40 and 64 years (78.7%).The same number of both genderswas included in the study. More than half of the patients were hypertensive (54.3%) and were taking more than one drug (59.8%). A small percentage was on insulin use (22.8%). More than 40% of the patients

had diabetes for more than 10 years. The majority of patients had uncontrolled glycemic status (72.4%) and had dyslipidemia (61%) and were obese (57.5%). A small percentage of the patients was asmoker (12.2%).

Table 1: Baseline Socio-Demographic Characteristics Data of Participants

Characteristics of Patients	Number	Percentage
Age categories (years)		
<40	13	5.1%
40-64	200	78.7%
≥ 65	41	16.1%
Gender		
Male	127	50%
Female	127	50%
Hypertension	138	54.3%
Oral hypoglycemic drugs		
One drug	102	40.2%
> one drug	152	59.8%
Insulin use	58	22.8%
Duration of diabetes (years)		
<5	70	27.6%
5-10	79	31.1%
>10	105	41.1%
Glycated hemoglobin (HbA1c)		
<7%	70	27.6%
>7%	184	72.4%
Dyslipidemia	155	61%
Smoking	31	12.2%
BMI		
<25	63	24.8%
25-29.9	146	57.5%
>30	45	17.7%

The prevalence of depression with different severity in patients was 70.9%. Most of the patients had a moderate level of depression (33.5%), followed by mild depression (23.2%), and severe depression (14.2%). Those who exhibited normal scales(no depression) constituted 29.1% (Table 2).

The analysis of depression among different patients' characteristic revealed that older patients (P=0.042); females (P<0.001); those patients on insulin use (P=0.006); the patients with longer disease duration (P=0.025); and had dyslipidemia (P=0.001); and smokers (P=0.033) had a substantially higher depression level (Table 3).

The different clinical severity of depression was considered as an outcome in univariate analysis. The study showed that being middle age (P=0.042); female (P<0.001); and having dyslipidemia (P=0.001) were potential predictors of having a higher severity of depression.

Table 2: Severity of Clinical Depression in Patients

Severity of depression	Frequency	Percentage
Clinical depression		
BDI score => 14	180	70.9%
BDI score <14	74	29.1%
Normal, non-depressed	74	29.1%
Mild severity (score 14-19)	59	23.2%
Moderate severity (score 20-28)	85	33.5%
Severe and Extreme (score ≥29)	36	14.2%

Table 3: AssociationOf Being Depressed With Patients' Characteristics

Patients' Characteristics	Numbers	Chi square value(X^2)	P value*
Age categories (years)		6.336	
<40	7		0.042
40-64	138		
≥ 65	35		
Gender		22.214	
Male	68		<0.001
Female	112		
Hypertension		0.112	
Yes	99		0.422
No	81		
Oral hypoglycemic drugs		1.765	
One drug	77		0.117
> one drug	103		
Insulin use		6.75	
Yes	49		0.006
No	131		
Duration of diabetes (years)		7.391	
<5	44		0.025
5-10	52		
>10	84		
Glycated hemoglobin (HbA1c)		0.83	
Controlled <7%	44		0.059
Uncontrolled >7%	136		
Dyslipidemia		11.85	
Yes	122		0.001
No	58		
Smoking		4.393	
Yes	17		0.033
No	163		
BMI		6.285	
<25	38		0.43
25-29.9	105		
>30	37		

*Univariate analysis of variance was performed for statistical analysis.

DISCUSSION

The author's aim in conducting the present study was to assess and evaluate the depression severity in a sample of Iraqi patients with type 2 diabetes in Duhok-Kurdistan Region.

The study showed that more than two third of the patients (70.9%) had depression. Prevalence of depression among populations according to diabetes severity and industrial world is different across the world. For example, Khamseh and Baradaran et al [19] found a similar depression rate of 71.8% in an Iranian adult sample, while an Iraqi study reported 37.2% of depression in Babylon [20].The lower level of depression has been reported in developed countries, for example between 2% and 28.8% in the USA [21] and 33.4% in Greece [22].

The study showed that being older is a significant predictor of more severe depression in patients with type 2 diabetes. The current finding is controversial. It is supported by some investigators [23], but not by others [24].Negative impacts on the health-related quality of life are reported frequently by older patients[25] as the older patients have more lack of support and use poorly health care services.

Being female was determined to be a substantial predictor of depression severity in accordance with other investigations.[26] The evidence report that women report depression twice as men [27], possibly it is affected by estrogen levels[28]. In addition, some social role has been attributed to female population, including passivity, dependence and emotional expression possibly make the women be more emotional and extroversive[29].

We did not find a statistically significant association between coexisting hypertension, oral hypoglycemic drugs, glycemic control and BMI, while a significant association between insulin use, duration of diabetes and smoking status with depression which were foundby univariate Chi-square test.

The present study did not show that poor glycemic control (HbA1c>7%) is a predictor of clinical depression in type 2 diabetic patients in spite of a higher level of poor glycemic control in the study sample in agreement with[30]. It may that??The patients with poor glycemic controls have not been affected by diabetes complications at this level.

The current study found that the duration of DM was not significantly associated with depression inconsistent with the findings reported by other studies[31]. However, it must be taken into account that diabetes-related complications are increased with a longer disease duration, therefore, one could expect a greater risk of depression [32].

The increased vulnerability to depression in patients with type 2 diabetes has not yet be frankly understood. However, depression has physiological changes according to the neuroendocrine system. The possible responsible factor for depression is considered to be associated with changes in the neurotransmitters in the brain like serotonin (5-HT), dopamine, and norepinephrine. These changes are monoamine neurotransmitters and have effects on mood and behavior. During psychological stress,counter-regulatory hormones like catecholamine a neurotransmitter, glucocorticoids, growth hormones, and glucagon are activated[33].

When counterregulatory hormones are activated, they are interfered with the insulin action and does not allow lowering the glucose level, subsequently, the glucose is elevated. This increase in the level of glucose develops a greater challenge in metabolic control maintenance.

The depression is escalated in patients with poor glycemic control and functional impairment owing to increase in diabetes complications and it is decreased due to response to antidepressant treatment[34].

Currently, only 31% of diabetic patients with known depressive symptoms receive adequate antidepressant treatment and only 6% receive between 4 and 5 sessions of psychotherapy within a 12-month period knowing that depression has devastating impacts[35].

One important finding in the present study, a statistically significant association between dyslipidemia and clinical depression (P= 0.001) in univariate statistical analyses. Huang and Lin et al[36] showed that statins use in diabetic patients with preexisting hyperlipidemia could decrease the risk of anxiety/depression, especially for patients older than 65 years and for female patients. Bajaj and Agarwal et al[37] did not find this kind of association as dyslipidemia enable toincrease the risk of macrovascular and microvascular complications.

There is a pathogenic pathway between diabetes and depression-like microvascular and microvascular complications, disability and comorbidities, perceived disease burden, diabetes length and treatment, smoking and persistent poor glycemic control [38].Around 67.2% of the depressed diabetic patients in this study had moderate to severe depression(BDI score $\geq$ 20) raising a deep

concern to the health care providers and its impacts on therapeutic compliance.

The above mentioned pathogenic pathways are possibly activated by several environmental factors, subsequently promoting T2DM and depression. One of the important factors is a low socioeconomic status which increases the disease likelihood[39]. Other common risk factors for diabetes and depression could be poor sleep, physical inactivity, and poor diet, but the key factor for this pathway could be stress system activation and disturbance. Chronic stress enables to activate the hypothalamus – pituitary – adrenal axis and the sympathetic nervous system, to increase the production of cortisol in the adrenal cortex and the production of adrenalin and noradrenalin in the adrenal medulla[40].

Weaknesses and strengths of the study

The findings reported in the current investigation must be interpreted in the light of study design and sample size as the cross-sectional study preclude the authors to establish a cause-effect pathway. The prevalence reported in the study may not be generalizable to other health settings owing to inherence of subjects participated in the study. Furthermore, the age was limited to equal or greater than 35 years and thus we have not estimated the prevalence of depression among patients with diabetes type2 in younger ages. However, the main strength of the present study is taking into account several medical and non-medical factors through the multivariate analysis.

The current investigation showed a high prevalence of depression (70.9%) in patients with type 2 diabetes in an Iraqi sample in Duhok city. The majority of the patients had a mild to moderate level of clinical

depression (56.7%). The study showed that being middle age, female gender, insulin use, duration of diabetes, smokers and having dyslipidemia were statistically significant predictors of having more severe clinical depression. The authors suggest that the patients diagnosed with type 2 diabetes be screened for possible clinical depression and subsequent treatment in this region.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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ئوختة

بەلاڤبوونا نەخوشییا خەموکی دناڤبەرا کومەکا نەخوشێن توشبویی ئێشا شەکریێ جورێ دووێ

پێشەکی و ئارمانج: نەخوشیا شەکرێ یەک ژ ئاریشەیێین هەرە گرینگێن چەرخێ ٢١ئ یه و نیگەرانی وەکو نەخوشیەکا هەمدەم دهێته هەژمارتن. نەخوشێن شەکرێ دوو بەرامبەر کەسێن ساخلەم ل مەترسیا نیگەرانیێ نه. پێش بینی کەرێن نیگەرانی ل نمونەیەکا نەخوشێن شەکرێ ل هەرێما کوردستانێ هاتن هەلسەنگاندن.

رێکێن ڤەکولینێ: ل ڤەکۆلینا نمونەڤەبرا بەردەست، ٢٥٤ نەخوشێن هاتی ناسین ب نەخوشیا شەکرێ جورە دوو ل باژێرێ دهوکێ دناڤبەرا ٢٠١٧/٦ و ٢٠١٨/١ هاتن بانگهێشت کرن. هەبوونا نیگەرانی ب ترازیا نیگەرانیا بێک هاته هەلسەنگاندن.

ئەنجام: ناڤەندان تەمەنێ نەخوشان ٥٥.٠٧ بو (ب ناڤبەرا ٣٣ حەتا ٩٠ سالی) ب هەژمارا بەرامبەرا ژن و مێران و بەرێ ٩.٩٦ سال خودان نەخوشی بون. ناڤەندا BMI ٢٧.٤ بو. پتر ژ ٧٠٪ ژ نەخوشان ژ کونترۆلا شەکرا خوینێ دەرکەفتی بون. نەخوشی یێن هەمدەم پێک دهاتن ژ پەستویا خوینێ (٥٤.٣٪)، نەهەمڤسەنگیا بەزێ خوینێ (٦١٪)، زیدەکێشه و قەلەوی (٧٥.٢٪). رێژەیەکا کێم ژ سەدی ئینسولین بکاردئانی (٢٢.٨٪) و جگارکێش بون (١٢.٢٪). رێژەیا هەبوونا نیگەرانی لناڤ نەخوشێن شەکرێ ٧٠.٩٪ ب ناڤەندا ٢٢.٢٩ بو. ڤەکۆلینێ نیشان دا کو پیر بون، مێ بون، و نەهەمڤسەنگیا بەزێ خوینێ پێشبینی کەرێن نیگەرانی نه.

دەرئەنجام: ڤەکۆلینا بەردەست نیشان دا کو پتر ژ ٧٠٪ ژ نەخوشێن نیگەرانی هەبوو ب دژواریا ناڤنجی حەتا گران. پیر بون، مێ بون، و هەڤسەنگیا بەزێ خوینێ وەکو پێشبینی کەرێن نیگەرانی ل نەخوشێن شەکرێ جورە ٢ هاتن دەست نیشان کرن.

الخلاصة

أنتشار الكآبة من بين مجموعة من المرضى الذين يعانون من النوع الثاني من السكري

الخلفية والأهداف: يعد مرض السكري من أكبرحالات الطوارئ الصحية العالمية في القرن الحادي والعشرين، ويظهرالاكتئاب عادة كحالة مرضية في الأمراض الطبية لمزمنة. المرضى الذين يعانون من مرض السكري يتضاعف لديهم احتمال معاناتهم من الاكتئاب مقارنة مع عامة السكان. تم فحص وتقييم بعض العوامل التي يمكن ان تنبئ بالاكتئاب في عينة من مرضى السكري من النوع الثاني في هذه الدراسة.

طرق البحث: في الدراسة المستعرضة الحالية ، تم شمول254 مريضا من المصابين بداء السكري من النوع الثاني من ثلاثة مراك زلمرضى السكري في مدينة دهوك في كردستان العراق في الفترة مابين يونيو 2017 وكانون الثاني2018. تم قياس وجود الاكتئاب من خلال مقياس (BDI-II).

النتائج: كان متوسط عمرالمرضى 55.07 ± 9.67 سنة (33-90 سنة) مع نفس العدد من كلا الجنسين وكان لديه المرض خلال آخر 9.96 سنة. كان متوسط مؤشركتلة الجسم 27.4. أكثرمن 70 ٪ من المرضى كانواغيرمسيطرين على مستوى سكر الدم. كانت نسب الاصابه بمرض مشترك كالاتي:ارتفاع ضغط الدم (54.3 ٪) ، اختلال نسب الشحوم في الدم (61 ٪)، زيادة الوزن والسمنة (75.2 ٪).
كانت نسبة صغيرة من المرضى على الأنسولين (22.8 ٪) والمدخنين (12.2 ٪). كان انتشارالاكتئاب السريري (BDI< 16درجة) بين المرضى 70.9 ٪ مع متوسط النتيجة 22.29. وأظهرت الدراسة أن الشيخوخة (0.03 = P) ،الجنس الانثوي (0.001> P) ،اختلال شحوم الدم (0.001 = P) تنبئ بالاكتئاب في عينة الدراسة.

الاستنتاجات: أظهرت الدراسة أن أكثرمن 70٪ من المرضى يعانون من الاكتئاب عند زيارةالعيادة التي كانت الغالبية فيها متوسطة إلى شديدة. تبين أن كبارالسن والجنس الأنثوي واختلال نسب الشحوم في الدم هي عوامل تنبئ بالاكتئاب لدى مرضى السكري من النوع الثاني.