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Relation between Psychiatric Symptoms and Diabetic Complications

Dilek Tuzun, Assist. Prof.[1], Emine Duygu Ersozlu Bozkirli, M.D. [2], Ayten Oguz, Assist. Prof [1], Murat Sahin, Assist. Prof. [1], and Kamile Gul, Assoc. Prof.[1]

[1] Kahramanmaras Sutcu Imam University, Faculty of Medicine,
Department of Endocrinology and Metabolism, KAHRAMANMARAS, TURKEY
[2]Adana Numune Training and Research Hospital, Division of Rheumatology, ADANA, TURKEY
*Corresponding author: *tuzund@gmail.com*

Abstract

Aim: Several factors may account for an unsatisfactory metabolic control of diabetes mellitus (DM). Among them it is important to emphasize the relevance of the occurrence of a psychiatric comorbidity. In this study, we aimed to inquire the relationship between psychiatric status with DM complications. **Material and methods:** 192 Tip 2 DM patients and 120 healthy control included in this study. Diabetic retinopathy was assessed by direct ophthalmoscopy. Urinary albumin excretion was determined in at least two 24 hour urine samples. Antropometric measurements were performed with a Tanita body composition analyser. Beck's Depression Inventory (BDI) and Beck's Anxiety Inventory (BAI) were administered. **Results:** The mean diabetic duration was 7.31±5.85 years. In type 2 Diabetic patients prevalance of depression was 45.8% while 20% in control group (p<0.001). In type 2 Diabetic patients prevalance of anxiety was 49% while 39.2% in control group (p<0.102). Mean BDI Score was 19.76±13.53 in diabetic patients and 12.20±6.54 in control group (p<0.001). Mean BAI Score was 17.43 ±12.68 in diabetic patients and 13.60±11.26 in contrrol group (p=0.007). There was positive correlation between BDI score and diabetic nephropathy (p=0.000 r=+0.315) and between BAI score and diabetic nephropathy(p=0.000 r=+0.265). **Conclusions:** Psychiatric symptoms, especially depression and anxiety, are widely seen in patients with diabetes mellitus. Therefore, in addition to the recent management of DM, psychiatric symptoms such as depressed mood and anxiety should also be taken into consideration in order to increase the quality of life in DM patients.

Keywords: depression, anxiety, diabetes mellitus, complications, obesity.

Introduction

Diabetes mellitus is a heterogeneous chronic metabolic disease resulting from defects in insulin secretion, insulin action, or both and associated with abnormalities in protein, carbohydrate, and fat metabolism (1). Long-term macrovascular, neurological, and microvascular complications, such as retinopathy, nephropathy, and neuropathy, are significant causes of morbidity and mortality in patients with diabetes (2).

Depression is more prevalent among adults with diabetes than among the general population (3). Both diabetes and depression are highly prevalent health problems that have a negative impact on various aspects of health, quality of life, and mortality (4).

In this study, we aimed to assess the relationship between psychiatric status with DM complications often neglected in type 2 DM patients.

Materials and Methods

Study Protocol

This single point cross-sectional case control study was conducted at the Endocrinology and Metabolism Clinic between January 2013 and January 2014. It was approved by the local ethics committee and written informed consent was obtained from all subjects. 192 type 2 Diabetes Mellitus patients and 120 age- and sex-matched normal healthy volunteers were recruited for the study. Diabetic patients with other predisposing factors for depression such as other chronic diseases, disability, other major psychiatric illness were excluded from the study.

Diabetic retinopathy was assessed by direct ophthalmoscopy. Urinary albumin excretion was determined in at least two 24 hour urine samples. Antropometric measurements were performed with a Tanita body composition analyser. The bioimpedance parameters we measured were body fat percentage (%BF), total body fat (TBF) (kg) and body mass index (BMI). Also Beck's Depression Inventory and Beck's Anxiety Inventory were administered to diabetic patients and controls.

Laboratory parameters

Blood samples for biochemical parameters were taken after an overnight fasting from an antecubital vein between 08:00 A.M and 09:00 A.M. Glucose was analysed with glucose hexokinase method, HbA1c were analysed with turbidymetric method(Siemens Dimension, Clinical Chemistry System, Newark, DE, USA) using appropriate commercial kits. Patients' renal status was assessed by the urinary albumin excretion rate in at least two out of three timed 24-h or overnight urine collections. Diabetic nephropathy was defined as macroalbuminuria (≥300 mg/24 h).

Antropometric Measuruments

Measurements of subjects' height, and weight were made and recorded by a designated physician. BMI was obtained by dividing the body weight (kg) by the square of height (cm). Each subject's fat mass (FM), percentage body fat, and free FM were calculated using a body composition analyzer (Tanita TBF-300, Tanita Corp., Tokyo, Japan).

Psychiatric Diagnosis and Measurement of Depression and Anxiety Symptoms

Anxiety, depression were evaluated using valid and reliable scales. The scales shown below were used for the patients and participants in the control group.

1. The Beck Depression Inventory

Beck's Depression Inventory is a self-report scale with 21 items. The objective of the scale is not to establish depression, but to objectively define the severity of depressive symptoms. Possible scores range between 0 and 63 points. Individuals having a score of 17 or greater are classified as clinically depressed. BDI was developed by Beck, and has been modified to Turkish by Hisli (5,6).

2. The Beck Anxiety Inventory

Beck's Anxiety Inventory is a self-report scale with 21 items. Total BAI scores range between 0 and 63 points. Increasing scores indicate severity of the intensity of anxiety symptoms. Individuals having a score of 17 or greater are classified as severe anxious. BAI was designed by Beck and colleagues, and the Turkish version was developed by Ulusoy (7,8).

Statistical analysis

Statistical evaluations were performed by running the SPSS 13.0 package program (SPSS, Inc., Chicago, IL, USA). While defining the data, number, percentage, mean, and standard deviation (SD) values were used. The normality of distribution of continuous variables was evaluated using the Kolmogorov-Smirnov test. For between - group comparisons Student's t test is used.

For comparisons of discrete variables, the chi-square and Fisher's exact test were used between independent groups. Pearson's correlation test was performed for correlation analysis. The level of significance was set at 0.05.

Results

192 Tip 2 DM patients and 120 healthy control was recruited to the study. Demographic and antropometric characteristics of the participants are presented in table 1. The characteristics of the groups showed no significant differences.

Table 1. Characteristics of patients with type 2 diabetes and control group

	Patients (n=192)	Controls (n=120)	P value
Age (years)	51.18±8.44	49.80±4.55	0.101
Female/Male (%)	66.1/33.9	66.7/33.3	1.000
Height (cm)	161.87±8.77	162.77±5.63	0.322
Weight (kg)	83.89±15.38	86.21±11.93	0.161
BMI (kg/m²)	32.11±5.84	32.88±6.63	0.277
Fat%	34.44±10.02	35.46±7.98	0.349
Fat (kg)	29.54±11.80	31.31±11.47	0.194
TBW	39.68±7.49	40.19±3.27	0.483

The mean diabetic duration of type 2 DM patients was 7.31±5.85 years. Mean glucose level was 179.66 ±75.35 mg/dl. Mean HbA1C (%) was 8.72±2.08. Retinopathy was present in 17.2 %, nephropathy in 20.3% of Tip 2 DM patients. Mean BDI Score was 19.40±13.53 in diabetic patients and 12.20±6.54 in control group (p<0.001). BAI Score was 17.44 ±12.68 in diabetic patients and 13.60±11.26 in control group (p=0.007). In 43.54% of females BDI Score was ≥17 while 21 % in men (p<0.001). In 57.5% of females BAI Score was ≥17 while 21% in men (p<0.001).

In type 2 Diabetic patients prevalence of depression was 45.8% while 20% in control group (p<0.001). In type 2 Diabetic patients prevalence of anxiety was 49% while 39.2% in control group (p<0.102) (figure 1, figure 2). In type 2 Diabetic patients with nephropathy the prevalence of depression was 87.2% while 12.8% in non nephropathic group (p<0.001). In type 2 Diabetic patients with nephropathy, the prevalence of severe anxiety was 82.1% while 17.9% in non nephropathic group (p<0.001). In type 2 Diabetic patients with retinopathy, the prevalence of depression was 60.6% while 39.4% in non retinopathic group (p=0.083). In type 2 Diabetic patients with retinopathy the prevalence of severe anxiety was present in 60.6% while 39.4% in non retinopathic group (p=0.181) (table 2). In clinically depressed patients, mean fasting glucose level was 193.12±81.93, while 167.95±67.38 in nondepressed tip 2 DM patients (p=0.018). Mean HbA1C was 8.80±2.30 in clinically depressed patients and 8.55 ±1.84 in nondepressed tip 2 DM patients (p=0.251).

There was positive correlation between BDI score and diabetic nephropathy (p=0.000 r=+0.315). Also there was positive correlation between BDI score and microalbuminuria (p=0.010 r=+0.185). Positive correlation between BAI score and diabetic nephropathy was detected (p=0.000 r=+0.265). Also there was positive correlation between BDI score and microalbuminuria (p=0.042 r=+0.147). There was positive correlation between BDI score and BMI, fat percentage, fat mass (p=0.001, r=+0.193; p=0.000, r=+0.213; p=0.001, r=+0.181, respectively). There was positive correlation between BDI score and BMI, fat percentage, fat mass (p=0.001, r=+0.193; p=0.000, r=+0.213; p=0.001, r=+0.181, respectively).

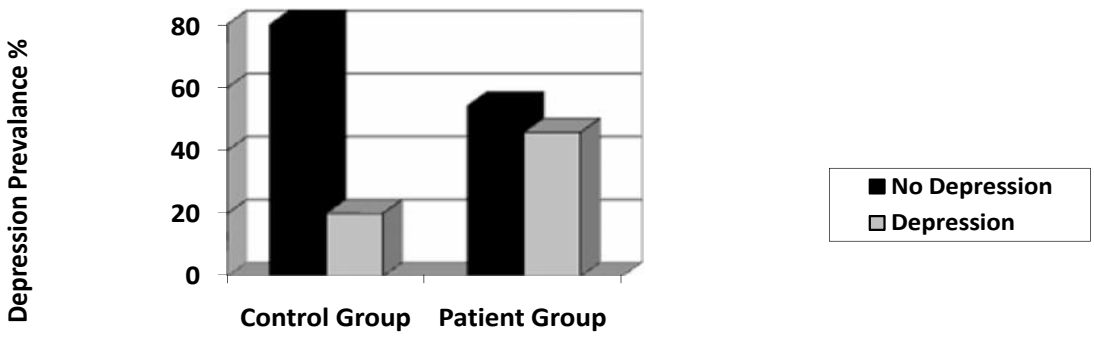

Figure 1. Prevalence of depression in control and patient groups. Data are presented as percentages.

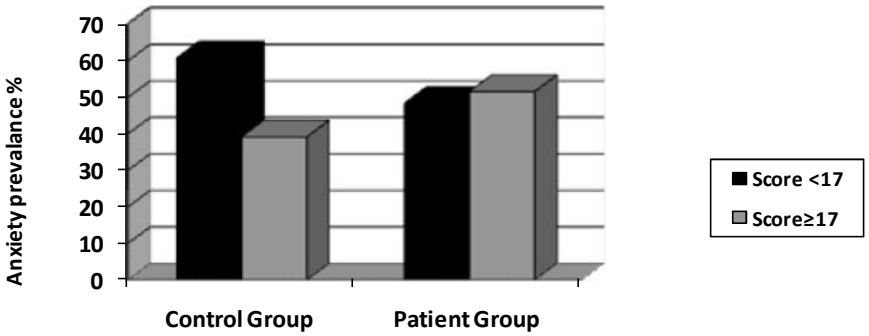

Figure 2. Prevalence of anxiety in control and patient groups. Data are presented as percentages.

Table 2. Comparison of patients with diabetic complications according to anxiety and depression scores

		BAI SCORE		P value	BDI SCORE		P value
		<17	≥17		<17	≥17	
Retinopathy	Positive (%)	39.4	60.6	0.181	39.4	60.6	0.083
	Negative(%)	53.5	46.5		57.2	42.8	
Nephropathy	Positive(%)	17.9	82.1	<0.001	12.8	87.2	<0.001
	Negative(%)	61.4	38.6		61.4	38.6	

BAI: Beck's Anxiety Inventory, BDI :Beck's Depression Inventory

Discussion

There is concern about an emerging diabetes epidemic in Turkey. According to The Turkish Epidemiology Survey of Diabetes, Hypertension, Obesity and Endocrine Disease (TURDEP-II) (n= 26,499), the prevalence of diabetes was 16.5 % (new 7.5 %), translating to 6.5 million adults with diabetes in Turkey(9).

Depression is estimated to affect 350 million people. The 2011 World Mental Health Survey, which included data from 17 countries, found that approximately 1 in 20 people report experiencing a depressive episode (10). People with diabetes experience a number of complications in the course of the disease, including mental health-related illnesses such as depression. Depression is one of the most common co-morbid conditions associated with diabetes (11).

Diabetes is a significant risk factor for depression and doubles the likelihood of co-morbid depression (11). Lifetime prevalence rates of depression among type 1 and type 2 diabetes patients range between 13% and 48.27% (3, 12-16). A meta-analysis by Mezuk et al. showed that depression is associated with a 60% increased risk of type 2 diabetes and type 2 diabetes is associated with 15% increased risk of depression (17). According to recent meta-analysis, 1.27-fold increase in risk for depression in adults with diabetes was demonstrated (18). In our study, prevalence of depression was 45.8% in type 2 DM patients. The reasons for the higher prevalence rates of depression in diabetic patients are not yet fully understood. The two dominant hypotheses concerning the initial occurrence or recurrence of clinically significant depression in individuals with diabetes are biochemical changes directly due to the illness or its treatment and psychosocial demands or psychological factors related to the illness or its treatment (19).

Diabetes is associated also with anxiety disorders (20). In the literature, it has been frequently observed that anxiety has more prevalence than depression. The prevalence rates of depression among type 2 diabetes patients range between 30.5% and 58.7% (13, 14, 21). In our study, the prevalence of anxiety was 49% in type 2 DM patients.

According to the literature depression and anxiety are associated with hyperglycemia (2, 22, 23). A meta-analysis of 24 studies demonstrated that depression in patients with diabetes was significantly associated with hyperglycemia in both type 1 and type 2 disease (24). In our study, in clinically depressed patients, mean fasting glucose level was 193.12±81.93, while 167.95±67.38 in nondepressed tip 2 DM patients (p=0.018). But we didn't find any association between depression and fasting glucose.

Evidence from prospective and cross-sectional studies has indicated that depression is associated with factors related to glucose dysregulation, including obesity and nonadherence to treatment, which increase the risk of diabetic complications (25). According to De Groot Et al meta-analysis there was a consistent and statistically significant correlation between the symptoms of depression and the severity or number of diabetic complications, such as retinopathy, nephropathy, neuropathy, sexual dysfunction, and macrovascular disease (26). In our study, the prevalence of depression was 87.2% in type 2 DM patients with nephropathy, 60.6% in type 2 DM patients with retinopathy. The prevalence of serious anxiety was 82.1% in type 2 Diabetic patients with nephropathy while 60.6% in retinopathy group. There was positive correlation between BDI score and diabetic nephropathy. Also positive correlation between BAI score and diabetic nephropathy was detected in our study.

Obesity and depression are increasingly prevalent public health concerns. Many studies have observed a positive relationship between depression and obesity (27, 28), while other studies report an inverse relationship or no significant relationship between the depression and obesity (29, 30). We found positive correlation between BDI score and BMI, fat percentage, fat mass.

Our study has one main limitation. Our study was performed cross-sectionally in a relatively small group from a single center. Therefore, our findings may not represent those of a broader population.

In conclusion, our study support the evidence that incidence of depression and anxiety is higher in diabetes than in non diabetes subjects. There is positive correlation between nephropathy and BDI and BAI scores. Therefore, we suggest that it is necessary to test diabetic patients for depression and anxiety using psychiatric diagnosis. Psychiatric symptoms such as depressed mood and anxiety should also be taken into consideration in DM patients with chronic complications. Finally, more comprehensive studies are necessary to determine conclusively the pathophysiological mechanisms present in this disease.

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