

## Frequency of depression in patients with Type 2 Diabetes Mellitus: Psychiatric support necessity for diabetic patients

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### Abstract

**Objective:** This study aims to determine the relationship between type 2 diabetes mellitus (DM) and the risk of depression in T2DM patients in comparison to a healthy control group.

**Materials and Methods:** The study sample included 100 patients diagnosed with Type 2 DM who were recruited consecutively from the general internal medicine polyclinic (46 males, 54 females, mean age 55.4±11.9 years) and 100 healthy control subjects who had no known diseases and had presented for routine check-up examinations (60 males, 40 females, mean age 37.6±3.7 years). The participants completed a questionnaire composed of a sociodemographic characteristics section and the Beck Depression Inventory, which probes the depression states of individuals based on self-report. Laboratory results of the participants were recorded.

**Results:** Mean Beck Depression Inventory scores of the patient and control groups, which represent self-reported depression states, were determined as 17±8.5 and 8.5±7.3, respectively. Of the 100 diabetic patients, 8 were determined to have severe depression, 38 moderate depression, 34 mild depression, and 20 minimal depression; whereas, of the 100 healthy controls, 20 were determined to have moderate depression, 18 mild depression, and 62 minimal depression, with no cases of severe depression in this group.

**Conclusion:** Our study reveals the importance of complementing the conventional patient follow-up procedure with psychiatric support in the management of type 2 DM patients.

**Keywords:** Depression; diabetes mellitus; Beck Depression Inventory

### Introduction

Type 2 diabetes mellitus (DM) is a chronic metabolic disease that requires constant medical care, in which the organism cannot utilize carbohydrate, lipid, and proteins adequately due to insulin deficiency or associated defects. According to the results of TURDEP-II, which was published in 2010, the prevalence of diabetes in the adult Turkish population has reached 13.7% (1-4). The rise in the prevalence rates of diabetes and associated complications has developed into a global health problem. Depression and anxiety are two times more common among diabetic patients than the normal population. In diabetic patients younger than 64 years; smoking, a low socioeconomic status, and being female were found to be independent risk factors for depression in the presence of poor glycemic control. Depressed and anxious individuals show lower compliance with dietary guidelines and medication use.

Some controlled studies have shown the treatment of depression to improve glycemic control (5). Depression has an unfavorable effect on the progression of chronic diseases such as diabetes. It was shown to have a negative impact on lifestyle changes and reduce treatment compliance in diabetic patients. Depressed diabetic patients experienced greater difficulty with dietary compliance, poor glycemic control, and an increase in complication and mortality rates. Studies have revealed a relationship between the number of depressive episodes and hemoglobin A1c (HbA1c) levels (6). This study aims to identify the sociodemographic characteristics of adult type 2 DM patients and to determine the relationship that levels of glycemic control, diabetes education, dietary compliance, and presence of diabetes complications have with the risk of depression in these patients.



## Materials and Methods

This study included 100 patients who had presented to the Internal Diseases Polyclinics of Fırat University Medical Faculty Hospital between September 2019-October 2019, who were under follow-up for a diagnosis of type 2 DM, who could comprehend and respond to questions, and provided informed consent (58 males, 70 females; mean age  $60 \pm 10.8$  years; range 30-80 years). Patients who were not within the specified age range, who were being treated for a psychiatric disorder, were pregnant, did not provide voluntary consent, did not agree to the interview, or did not have the mental capacity to comprehend questions were excluded from the study. The patients completed a form that was constructed by the researcher and probed sociodemographic characteristics, and their height and weight, HbA1c levels and laboratory data obtained during routine follow-up were recorded. The patients were administered the Beck Depression Inventory through face-to-face interviews. The Beck Depression Inventory was developed in 1961 by Beck and colleagues. Its validity and reliability were established in our country in 1989 by Hisli and colleagues. The inventory assesses the physical, emotional, and cognitive symptoms of depression. It contains 21 items, each of which include four self-assessment phrases. The items are scored from 0 to 3. The sum of item scores produces a total depression score. A high score indicates more pronounced depressive symptoms (7, 8). Scores of 0-9 are considered to indicate minimal or no depression, 10-16 mild depression, 17-29 moderate depression, and scores of 30 and higher indicate severe depression (9). Data obtained from each questionnaire was tested for statistical significance within groups using the t-test.

The study protocol was approved by the ethics committee of the hospital. The patients provided written informed consent. The study was conducted in accordance with the guidelines stated in the Helsinki Declaration.

**Statistical Analysis:** Statistical analysis was conducted using IBM's SPSS for Windows Version 22 (IBM Corporation, Armonk, NY, USA). Data obtained from each group was tested for normal distribution using the Kolmogorov-Smirnov test. Data with a normal distribution were analyzed using the t-test in independent groups;

data with a non-normal distribution were analyzed using the Mann-Whitney U test and the Kruskal Wallis variation analysis. Qualitative data were analyzed using the Chi-square test. Quantitative data were presented in the form of mean  $\pm$  standard deviation. Qualitative data were presented as "number (%)". A 95% confidence interval (CI) and a significance level of  $p < 0.05$  were adopted.

## Results

This study included 200 individuals consisting of 94 females (47%) and 106 males (53%). Of the participants, 174 (87%) were younger than 65 years and 26 (13%) older than 65 years. Diabetes mellitus patients were administered the Beck Depression Inventory in order to determine the presence of symptoms of depression. According to the Beck Depression Inventory, 80 (80%) of the 100 diabetic patients showed symptoms of depression; these symptoms were severe in 8 cases, moderate in 38 patients, and mild in 34 patients. In the healthy group composed of 100 individuals, 38 showed symptoms of depression, which were moderate in 20 individuals and mild in 18 individuals. Responses to the items in the questionnaire were compared with regard to statistical significance and the outcomes were presented in the tables provided below (Table 1) (Table 2).

Mean scores on the Beck Depression Inventory, which represent self-reported depression states, were  $17 \pm 8.5$  and  $8.5 \pm 7.3$  for the patient and control groups, respectively. When these scores were compared across genders, females demonstrated a higher risk of depression (63.8%) than males (54.7%). Mean scores on the Beck Depression Inventory were determined as 14.4 for females and 11.34 for males, with a statistically significant difference in terms of the risk of depression ( $p = 0.014$ ).

In the diabetic patient group, female patients had a mean Beck depression score of 19.4 while males had a score of 14.1, and this difference was statistically significant ( $p = 0.002$ ). The mean HbA1c value was  $6.3 \pm 3.2$  and HbA1c levels were determined to have a positive correlation with depression scores ( $p < 0.001$ ). Hemoglobin A1c levels were significantly higher in those who showed a risk of depression than in those who did not (respectively, 8.67 and 6.08), and this difference was statistically significant ( $p < 0.001$ ).

**Table 1:** Sociodemographic characteristics and clinical data of the study population

	Type 2 dm(n=100)	Control(n=100)	p
Age (years)	55,8 $\pm$ 11,8	52,8 $\pm$ 12	0,08
Married (n-%)	87 (87%)	86 (86%)	0,948
Smoke (n-%)	40 (40%)	52 (52%)	0,264
FBG(mg/dL)	163,5 $\pm$ 54,3	88,9 $\pm$ 10	<0,001*
ALT( U/L)	24 $\pm$ 14,8	27,4 $\pm$ 15,7	0,111
AST( U/L)	23,1 $\pm$ 10,8	22,6 $\pm$ 6,4	0,669
LDL-C(mg/dL)	125,5 $\pm$ 47,5	108,3 $\pm$ 32,4	0,003*
Triglyceride(mg/dL)	205,9 $\pm$ 159,3	123,7 $\pm$ 57	<0,001*
BUN(mg/dl)	22,9 $\pm$ 11,5	13,3 $\pm$ 3,55	<0,001*
Creatinine(mg/dL)	1 $\pm$ 0,79	0,77 $\pm$ 0,19	0,008*
HbA1c(%)	10,3 $\pm$ 2,4	4,8 $\pm$ 0,35	<0,001*

\* Statistically significant differences.

**Table 2:** Depression scores of the study population

these parameters were higher in males, in contrary to the

	Type 2 dm(n=100) (m=46/f=54)	Control(n=100) (m=60/f=40)	p
<b>BDI Scores(male/female)</b>	14,1 ±7,7/19,4±8,5	9,1 ±7,5/7,7±7	
<b>Total</b>	17±8,5	8,5±7,3	<0,001*
<b>BDI risk of depression(male/female)</b>			
Minimal depression	14/6	34/28	
Mild depression	18/16	14/4	
Moderate depression	14/24	12/8	
Severe depression	0/8	0	

\* Statistically significant differences.

## Discussion

Besides being a chronic physical disease, diabetes mellitus is a chronic disease that can lead to a series of mental, emotional, social, and psychosexual problems for the patient.

While it can cause psychiatric disorders by impacting brain functions, psychiatric conditions may also arise from its impact on the daily lives of the patients. Such problems that accompany diabetes mellitus affect its manifestation, severity, and progress, as well as the response to the treatment.

The holistic approach to diabetic care requires the comorbid mental, psychological, psychophysiological, and psychosocial conditions to be diagnosed and treated besides considering the patients' physiological wellbeing (10).

In a study conducted by Patten (11), individuals with long-term medical disorders were reported to demonstrate a greater risk of developing major depression than those who did not suffer from long-term medical disorders. individuals who have myocardial infarction, DM, diseases associated with the human immunodeficiency virus, cancer, cerebrovascular events, and Parkinson's disease were found to experience a greater risk of developing major depression than healthy controls.

Chronic medical diseases also show a strong independent relationship with anxiety disorders (12). In this study, we aimed to investigate the causes of the increased risk of depression in type 2 DM that has been reported in the studies cited above.

We studied the relationship that levels of glycemic control, diabetic complications, and sociodemographic characteristics of patients diagnosed with the chronic disease of diabetes mellitus have with their risk of developing depression and anxiety.

## Conclusion

In conclusion, we determined that, in patients who demonstrate an increased risk of depression that parallels elevated HbA1c levels, the presence of diabetic nephropathy and retinopathy increase the risk of depression. We found that females diagnosed with diabetes mellitus had higher Beck depression scores and a higher risk of depression than males; whereas in healthy controls,

Our study shines light on the prediction of the risk of depression in patients diagnosed with DM, and with the consideration that patients could need psychiatric treatment in combination with diabetic treatment, it has revealed the importance of maintaining psychiatric treatment in the management of DM patients.

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**Author's Contributions:** EÖ, YG, MA, BY, ED: Patient examination, biochemical analyzes, Data Collection, EÖ: Literature Search, Preparation of the article, statistical analysis, revision of the manuscript

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