

Evaluate the prevalence of depression in type 2 diabetics with microvascular complications

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ABSTRACT

Introduction: Diabetes is one of the most common diseases in the world that is accompanied with many microvascular complications. Any chronic disease such as diabetes can cause types of mood disorders such as depression in patients. The aim of this study was to evaluate the prevalence of depression in type 2 diabetics with microvascular complications. **Execution Method:** In this cross-sectional study, type 2 diabetics with microvascular complications that referred to Hazrat Rasoul Akram Hospital during 2016-2017 were studied. After verification of retinopathy and nephropathy in patients, 100 patients were enrolled in the study and correlated between variables such as age, sex, body mass index, medication, education, retinopathy, nephropathy, marital status, hemoglobin A1c (HbA1c), triglyceride, low-density lipoprotein (LDL) and high-density lipoprotein (HDL), blood pressure, and fasting blood sugar was investigated in patients given the possibility of depression. **Results:** The results of this study showed that 72% of patients were with depression and by evaluating the mentioned variables with depression disorder it was found that there was a significant relationship between fasting blood sugar, HbA1C, retinopathy, medication, and LDL with depression. **Conclusion:** Given the high prevalence of depression (72%) in diabetics in this study, it seems that psychiatric consultation is needed to diagnose depression in diabetics.

Keywords: Depression, hyperglycemia, quality of life, type 2 diabetes

Introduction

Diabetes is one of the most common diseases in the world and in Iran, which is chronic, progressive and costly, and causes many complications.^[1]

It is always difficult for a diabetic person to accept and admission that they have to change their lifestyle based on disease.^[2]

Although chronic diseases are probably the result of interaction with genetic, behavioral, and environmental factors, the evidence

suggests that behavioral and environmental influences play a more importantly role than biological changes in the occurrence and persistence of chronic diseases such as diabetes.^[3]

Any chronic disease can be very debilitating and costly, and it can cause many problems for the patient for years that affect the patient's daily life and mood. These mood disorders, such as depression, can reveal itself more in patients who have complications.^[4]

Depression is a mood disorder that reveals itself with symptoms such as low mood, loss of pleasure and interest, weight loss, insomnia, exhaustion, emptiness, guilty, and inability to concentrate and death-related thoughts. Diabetics with depression have less adherence to diet and medication as well as

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have less control over their blood sugar. The first symptom of depression in patients with diabetes is the loss of motivation and interest in the individual, which results a decrease in activity and efficiency, a decrease in life expectancy, a decrease in self-care, and a tendency to die in the patient.^[3,5]

Conducted studies on the prevalence of depression in diabetics have shown that there are several factors contributing to the increase of mental disorders in these patients.^[6] Urrutia *et al.*^[7] stated that patients with type 2 diabetes can have a far lower quality life, disability and even death ahead, and the diabetic retinopathy and nephropathy, after age and sex, have a role in the rate of depression. Koponen *et al.*^[8] showed that increased glucose and hyperinsulinemia may increase the risk of depression and the risk of suicide.

According to the above items and increasing the prevalence of diabetes in the world and psychological problems in patients with type 2 diabetes, which may reduce the quality of their life and increase suicide in them, the purpose of this study was to evaluate the prevalence of depression in diabetics with microvascular complications, which can have a lot of negative effects on the patient's life and treatment and can cause disruption in improvement of patients.

Materials and Methods

In this cross-sectional study, type 2 diabetics with microvascular complications that referred to endocrine and general clinics of Hazrat Rasoul Akram Hospital during 2016–2017 were studied. Diabetics were examined by an ophthalmologist for diagnosis of retinopathy, observation of retinal vascular micro aneurysms and spotting bleeding and cotton-wool spots. The nephropathy of patients was also defined as higher than 30–299 μg per deciliter of albumin excretion in 24-h urine, which must be positive in two or three tests at 3–6 months of interval. On the basis of the microvascular complications in patients with type 2 diabetes, 100 patients were included in the study. Depression was evaluated by Hamilton 24-question questionnaire (HRSD24) and the score >7 was considered depressed. The studied variables in patients included age, sex, body mass index (BMI), medication, education, retinopathy, nephropathy, marital status, hemoglobin A1c (HbA1c), triglyceride, low-density lipoprotein (LDL) and high-density lipoprotein (HDL), blood pressure and fasting blood sugar, which the correlation between the above variables and the probability of depression in patients was evaluated.

In this study, patient's privacy and confidentiality in laboratory data were kept. Also, the Helsinki Declaration's provisions in human studies were considered and the identities of the patients were kept secret by the used codes.

Statistic analysis

Data were analyzed by Statistical Package for the Social Sciences (SPSS) software program, version 22.0 Statistical Package for Social Sciences (SPSS for Windows, Version 16.0. Chicago, SPSS Inc.). The obtained results were expressed as

mean and standard deviation for the quantitative variables and as percentages for the qualitative variables, and the comparisons between qualitative variables were performed using Chi-square test or Fisher test. The significance level was considered at <0.05 .

Results

In this study, a total of 100 type 2 diabetics with microvascular complications were investigated. The mean age of the patients was $014/4 \pm 5/69$. According to gender, 40 patients were male and 60 patients were female. The evaluation of BMI showed that 55 people had the index >30 and 45 had the index <30 . In this study, 41 patients were treated with insulin and 59 were treated with oral medication. The examination of education of the patients showed that 18 patients were illiterate, 39 patients had cyclists, 33 patients had diploma, and 10 patients had university education. Given the results of this study, 95% were married and in 66% of patients HbA1C level was >7 . In the evaluation of retinopathy, nephropathy, and neuropathy, it was found that 20%, 50%, and 90% of patients had mentioned complications, respectively.

The abundance of triglyceride, hyperglycemia, and LDL showed that 45 patients had triglyceride rates >150 and 65 patients had LDL rates >100 . In the study of HDL level, patients were divided into two groups of males and females, then males divided into two groups of below 40 HDLs and above 40 and also, females divided into two groups of below 50 HDLs and above 50 and it was found that out of the 40 males in this study, 25 people had above 40 HDLs and out of the 60 women, 38 people had above 50 HDLs. The evaluation of the abundance of fasting blood sugar and blood pressure in patients showed that 95% of patients had above 100 blood sugar and 80% of patients had above 130/80 blood pressure.

In this study, 72% of patients suffered from depression, which their relationship with these variables was evaluated. According to Table 1, the relationship between depression and demographic factors in patients was evaluated and it was found that there was a direct correlation between age, medication, and the education of patients with the prevalence of depression.

The investigation of the relationship between depression and complications of diabetes in patients showed that there is a direct correlation relationship between retinopathy and HbA1c level and depression in patients [Table 2].

Discussion

The simplest response of a diabetic person looking for awareness of the disease and to tolerate the limitations and complications of the disease will be anxiety and depression, as the patient has to be compelled to restrict some of his or her life's freedoms, such as the amount and type of food intake and sometimes the amount of physical activity, and it can cause many problems in adapting to their diet, which sometimes causes depression or stress.^[5,9]

Table 1: The relationship between depression and demographic factors in patients

P	Depression		Variable	
	No (n/%)	Yes (n/%)		
0.002	21 (21)	49 (49)	65-70	Age
	5 (5)	15 (15)	71-75	
	2 (2)	8 (8)	>75	
0.585	10 (10)	30 (30)	Male	Sex
	18 (18)	42 (42)	Female	
0.858	15 (15)	40 (40)	Yes	BMI
	13 (13)	32 (32)	No	
0.001	0	41 (41)	Insulin	Medication
	28 (28)	31 (31)	Oral	
0.001	11 (11)	7 (7)	illiterate	Education
	7 (7)	32 (32)	High school	
	10 (10)	23 (23)	Diploma	
	0	10 (10)	College	
1.000	27 (27)	68 (68)	Married	Marital status
	1 (1)	4 (4)	Single	

Table 2: The relationship between depression and complications of diabetes in patients

P	Depression		Variable	
	No (n/%)	Yes (n/%)		
0.008	8 (8)	42 (42)	Yes	Retinopathy
	20 (20)	30 (30)	No	
0.373	4 (4)	16 (16)	Yes	Nephropathy
	24 (24)	56 (56)	No	
0.137	23 (23)	67 (67)	Yes	Neuropathy
	5 (5)	5 (5)	No	
0.035	14 (14)	52 (52)	>7	HbA1c
	14 (14)	20 (20)	<7	

According to the results of this study, 72% of patients had depression and there was a significant relationship between education, fasting blood sugar rate, HbA1c, retinopathy, medication, and LDL with depression [Table 3].

Numerous studies have investigated the role of depression and anxiety in patients with type 2 diabetes and healthy individuals, and their results have shown that depression and anxiety in women are higher due to more spiritual pressures and they are more likely to have diabetes, and higher education increases awareness and information about the disease, and educated people follow better self-care principles.^[10,11] Rising the record of the disease leads to the emergence of disease complications and the disappointment to the improvement of the disease, which appears in the form of depression and anxiety. In people who have diabetes, there are factors such as limitation of resources and facilities and physical weakness that cause depression and anxiety at different ages.^[12]

When a diabetic patient is depressed, he/she often conducts self-destructive behaviors such as eating and drinking a lot, which cause the disease to get out of their control.^[13] The results of the Egede *et al.*^[14] study showed that depressed diabetics compared

to nondepressed diabetics receive more prescriptions, use more outpatient care, and their care costs are 4.5 times higher.

Depression exacerbates diabetes and therefore worsens the prognosis of diabetes; however, the depression in these patients is less noticed or not recognized, due to the physician neglect or because of some physical symptoms and signs of depression being shared with diabetes complications. The symptoms and signs of the depression may be attributed to the disease-induced stress, the period of chronic disease, or the side effects of taking medication. As a result, undiagnosis and therefore timely untreated of depression in diabetics cause numerous problems for those who also suffer from many complications of diabetes. Among these problems is a decrease in quality of life, thereby reducing the patient's motivation to control blood sugar and treat the disease. Lack of acceptance or defect in acceptance of dietary or medication instructions by the patient, increasing the need for health care and thus increasing costs, disregarding recommendations and interventions to control weight, and increasing the probability of alcohol and drug abuse are the problems of depressed patients.^[6,15]

Yu *et al.*^[16] in a study examined the mental status of 1187 diabetics. The purpose of their study was to determine the relationship between diabetics and depression and social and cognitive factors of diabetes, in which there was a significant relationship between the above 65 years old and high-school education.

In another study, Akhilesh *et al.*^[17] in the investigation of the prevalence of exhaustion and depression in patients with type 2 diabetes evaluated and compared 100 healthy and diabetics with age 18–70 years with a detailed assessment of demographic and clinical social parameters. Their results showed that 68% of patients had exhaustion and 53% had depression using PIQ-9 and Fatigue Severity Scale (FSS) questionnaires, which was 27 and 10 times more than healthy people, respectively. In their study, the duration of disease, postprandial blood sugar levels, diabetes complications, and BMI had a significant relationship with depression.

Also, Yaffe *et al.*^[18] in the study of relationship between diabetes and fasting blood sugar disorder with risk of dementia and health problems in older women reported that women with fasting blood sugar disorder had a greater cognitive impairment than women with normal glucose levels.

Urrutia *et al.*^[7] in a study reported that of 108 patients with type 2 diabetes, the prevalence of depression was 56% and there was a significant relationship between age, sex, diabetic retinopathy, and neuropathy with depression. Compared to our study, depression was more prevalent and there was no significant relationship between gender and depression; also, there was no significant relationship between depression and neuropathy, which could be due to the fact that 90% of our patients did not have neuropathy. In addition, there was almost no gender difference in this study and the number of men and women was approximately equal.

Table 3: The relationship between depression and blood factors of diabetics

P	Depression		Variable	
	No (n/%)	Yes (n/%)		
0.107	9 (9)	36 (36)	>150	TG
	19 (19)	36 (36)	<150	
0.015	13 (13)	52 (52)	>100	LDL
	15 (15)	20 (20)	<100	
0.457	5 (12.5)	20 (50)	>40	Male
	5 (12.5)	10 (25)	<40	
	12 (26.7)	26 (43.3)	>50	Female
	6 (10)	12 (20)	<50	
0.001	23 (23)	72 (72)	>100	Fasting sugar
	5 (5)	0	<100	
0.181	20 (20)	60 (60)	Yes	Blood pressure
	8 (8)	12 (12)	No	

Also, Liu *et al.*^[19] examined the related factors to quality of life including depression, social rank, and gender in patients with type 2 diabetes. Their study was conducted on 791 patients, of those, 422 were depressed. According to their findings, the use of glucose or insulin reducer medications has a role in the prevalence of depression in diabetics, which is consistent with our study in the significant relationship between depression and insulin or oral medications, In contrast, Cox *et al.*^[20] in a study of the potential effects of insulin regimens on patients with type 1 diabetes and negative mood disorders and cognitive symptoms showed that there were no significant differences between different medications and symptoms of negative mood disorders.

As depression is a risk factor for suicide, several studies have investigated the related factors in patients with diabetes. Lee *et al.*^[21] by study of 9159 diabetics over 40 years old have reviewed the suicide risk based on duration of diabetes, medication, and HbA1C ≥ 6.5 levels in diabetic and nondiabetic individuals. They showed that suicidal thoughts were significantly higher in patients who have injected insulin, and had diabetes for more than 5 years, and also had high HbA1c and they are more at risk of suicide than healthy people.

Koponen *et al.*^[8] studied the prevalence of suicide attempt in patients with impaired glucose metabolism, and stated that patients with depression and suicidal behavior had higher blood glucose concentrations and higher glucose levels were associated with the prevalence of suicide. Also, insulin resistance and impaired glucose and fat metabolism in depressed middle-aged patients may lead to suicidal behavior.

Generally, it is difficult to investigate the depression in a person with diabetes. Because the symptoms and signs of depression may be attributed to the stress of the disease, the process of chronic disease, or the side effects of taking medication. Therefore, disregarding the signs and symptoms of depression and attributing all of these symptoms to the chronic course of diabetes causes the patient to suffer from two chronic and relatively debilitating diseases; it means diabetes and depression,

which can impair the treatment of the disease. For this reason, referring the patient to a psychiatrist or psychologist in a timely manner seems necessary, especially in foreseeable crises cases in diabetes, such as onset of the disease, onset of insulin dependence, or the need for changing the lifestyle or incidence of physical disabilities, including the need to amputation.

Conclusion

Given that the prevalence of depression in diabetics is 72%, it seems that diabetics should be under the care of psychiatrists, because depression treatment is probably effective in controlling diabetes complications. Also, the lack of complications helps the quality of life of patients. In addition, the level of information and knowledge of patients and families need to be increased, and diabetics should increase their knowledge and self-management knowledge in order to reduce anxiety and depression.

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Conflicts of interest

There are no conflicts of interest.

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