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A COMPARATIVE ANALYSIS OF DEPRESSION IN DIABETICS AND NORMAL INDIVIDUALS

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ABSTRACT

Diabetes mellitus (DM) is a group of prevalent metabolic disorders that have the hyperglycemia phenotype in common. Regardless of the physical aspects and long lasting complications of diabetes in the majority of organs, depression is one of the most psychological aspects of the disease that engages a considerable percentage of patients.

The present study is a prospective case-control study conducted by using the cross sectional method on patients receiving services from 2010 to 2011 at Shahid Beheshti Training and Medical Clinic of Shiraz. The sample population included 200 individuals 100 of which were diabetics and 100 were non-diabetics. The process of sampling lasted for 9 months (September-May). In addition, the Beck Depression Inventory (BDI) was used as the depression screening tool. This is a 21-question test with four options assigned to each question. The individuals should choose the option that reflects their current condition.

The rate of the prevalence of depression among the diabetics and non-diabetics was 79% and 61%, respectively. There was also a significant relationship between diabetes and severity of depression (P=0.05). Moreover, there was a significant relationship between depression and complications of diabetes because depression was most prevalent among individuals with retinopathy and cardiovascular problems (P<0.05). Non-diabetics aging 30 to 50 had the highest level of depression (P<0.05), while there was no significant relationship between the ages of diabetics and severity of depression.

Depression, as an important mental disorder, was more prevalent among diabetics with uncontrolled blood sugar and systemic complications. Therefore, patients with diabetes are prone to depression from the early days or years of their medical condition. Since depression leads to inappropriate control of diabetes, more complications will accompany the disease. However the most common complications associated with this disease are retinopathy, cardiovascular problems, and nephropathy.

Keywords: Comparison, Depression, Diabetics, Normal Individuals

INTRODUCTION

Depression is a term that has been used in transcripts from the very past. For instance, about 450 years B.C. Hippocrates used the term “melancholia” to refer to a type of depression **[1]**. Depression is one of the most common mental disorders characterized by prolonged disease courses, diverse symptoms, high probability of recurrence, and physical and psychological disorders. This disorder has a prevalence rate of 25% among the public with a recurrence rate of more than 50% **[1]**. The first psychological sign of depression is decreased motivation and interest. This sign is followed by a reduction in activity and efficiency, life expectancy and self-care, and an increase in willingness to die. Mood change is one of the permanent and resistant symptoms of depression that is seen for a number of days, weeks, and months **[1, 2]**. On the other hand, it is believed that psychological factors contribute to the development of any kind of disease or disorder as well. Diabetes is a medical illness that is classified into the group of psychosomatic illnesses **[1]**. It is one of the most common metabolic and neuroendocrine diseases, which is classified into the following groups based on its pathogenesis: type I diabetes, type II diabetes, and diabetes with secondary causes **[3, 4]**. In a study conducted by **[5]** on 578 diabetics it was found out that diabetes adds to the risk of psychological disorders and symptoms **[5]** and depression is the major mental disorder that accompanies diabetes **[1, 6]**.

In another study performed by Grandinti et al. on 574 native Hawaiian patients it was concluded that increase in the prevalence of depression is more common in diabetics **[7]**. Moreover, it was found out that there is a relationship between depression and blood sugar in diabetics **[8]**. Previous studies suggest that depression is accompanied by an increase in blood sugar in patients with type I and type II DM **[9]**. Other analyses also indicated that up to 40-50% of the elderly suffering from physical diseases, such as diabetes or heart failure, may develop depression. However, the prevalence of depression among old patients who are either hospitalized or reside in nursing homes is 50%. Depression in such individuals is revealed through unusual symptoms such as physical disorders and anxiety **[10]**. In addition, analysis of patients with type II diabetes indicated that 46% of diabetics with depression were women. Besides, the duration of diabetes is also one of the risk factors influencing the outbreak of depression **[11]**. Some other studies have shown that blood sugar is not properly controlled in patients suffering from depression **[12]**. In addition, epidemiology of depression does not include medical disorders such as diabetes but this disorder is probably common and often remains undiagnosed **[6]**. In 2001, researchers confirmed that depression is significantly more common in diabetics (about twice) than non-diabetics **[13]**. Ashtrnad *et al*., 1999, reported that the rate of depression in diabetics is 40-50%. On the other hand, there is a type of depression that is directly caused by biological and physical conditions such as diabetes mellitus **[2, 15]**. Some reports indicate that depression and diabetes often co-occur and patients suffering from depression are often resistant to insulin **[16]**. Due to the importance of the aforementioned points, the most important objective of the present study is to perform a comparative analysis on diabetics and normal individuals.

METHOD

This is a prospective case-control study conducted by using the cross sectional method on patients receiving services from 2010 to 2011 at Shahid Beheshti Training Clinic of Shiraz. The sample population includes 200 individuals 100 of which are diabetics and 100 are non-diabetics. Samples are randomly selected from the communities of diabetics and normal individuals. The process of sampling lasted for 9 months (September 2010-May 2011). The sampling criteria included criteria on age, gender, duration of diabetes, and macrovascular and microvascular complications of diabetes. Patients with a history of pre-diabetes mental disorders or patients in families suffering from mental disorders were excluded from the study.

After explaining the research objectives to the patients and obtaining their consent, each of them was provided with an inventory. The Beck Depression Inventory (BDI) was used as the depression screening tool. This test was originally developed by Beck *et al*., in 1961 as a means of analyzing depression. Literate visitors answered the questions in person but the undereducated or illiterate ones answered the questions orally while their answers were being recorded in papers. The individuals had to choose the option that reflected their current condition. The Beck test is a 21-question test (13 cognitive and 8 somatic questions). Each of the indexes (items) of the Beck test is scored by 0, 1, 2, and 3. Score 0 stands for lack of disorder while score 3 stands for the most severe disorder. The total score obtained in the test varies between 0 and 63. In order to analyze the test results all the scores obtained by an individual were summed up: scores between 0 and 9 indicated lack of depression; scores between 10 and 18 indicated minimal depression; scores between 19 to 29 indicated moderate depression; and scores between 30 to 63 indicated severe depression. Having completed the Beck Depression Inventory, the individuals were provided with information forms. These forms covered the following information: demographic information, history of depression, and duration of diabetes and its complications, if any. In order to making distinctions between complications of diabetes the patients records, their Hx or that of their companions were used. The following items were examined by collecting data and information using statistical methods:

1. Comparison of the frequency of depression among diabetics and normal individuals.
2. The relationship of age and gender with depression.
3. The relationship between duration of diabetes and depression.
4. The relationship of macrovascular and microvascular complications of diabetes with depression.

In this study, descriptive statistics including tables were used to express the observations. In addition, the Kass score test, the Fisher's exact test, the Pearson's correlation coefficient, and the analysis of variance (ANOVA) were used at a significance level of $P \leq 5$ in order to examine the relationship between the measured factors and analyze the research assumptions.

RESULTS

The results of the Beck test indicated that 79 diabetics (79%) and 61 non-diabetics (61%) suffered from depression. Among the depressed diabetics, 33 individuals (33%) showed symptoms of minimal depression, 31 (31%) had moderate depression and 15 (15%) had severe depression. In addition, 21 (21%) individuals were also free from depression. On the other hand, 41% of non-diabetics suffered from minimal depression, 13% had moderate depression and 7% had severe depression. In addition, 39% of non-diabetics were free from depression. The analyses indicate that patients with diabetes are prone to depression more than normal people (non-diabetics) **(Tables 1 and 2)**.

The individuals under study aged between 19 and 90 (with an average age of 54.5). They were classified into the following three age groups: < 30 years old; 30-50 years old; and > 50 years old. A total of 40 diabetics (40%) aged between 30 and 50 and 60 diabetics (60%) aged 50 and over. There was no patient with diabetes aging less than 30. On the other hand, among the non-diabetics 53 individuals (53%) aged less than 30 years, 32 (32%) aged between 30 and 50 and 15 (15%) aged more than 50. In addition, 25 (47.16%) out of 53 non-diabetics aging less than 30 suffered from depression, 25 (78.12%) out of 32 non-diabetics aging between 30 and 50 suffered from depression, and 11

(73.3%) out of 15 non-diabetics aging more than 50 were depressed. Therefore the 30 to 50 age group was the group with the highest rate of depression **(Table 3)**.

Diabetes lasted in patients from 2 month to 25 years with an average duration of 7 years (94.34 month). The duration of diabetes falls into the following three ranges: less than 5 years; 5 years; and more than 5 years. A total of 51 individuals had diabetes for less than 5 years, 29 of which were women (43.9%) and 42 were men (64.7%). In addition, 49 patients had suffered from diabetes for more than 5 years, 37 of which were women (56.1%) and 12 were men (35.3%). 37 (72.5%) out of 51 diabetics, who had diabetes for less than 5 years, were depressed while 42 out (85.7%) of 49 patients, who had diabetes for more than 5 years, were depressed as well. According to the statistical results and tests results it can be said that there was no significant relationship between duration of diabetes and depression ($P=0.106$). Therefore, duration of diabetes does not contribute to the development of depression in patients with diabetes **(Table 4)**.

Analysis of the complications of diabetes indicated that 87 (87%) out of 100 diabetic patients suffered from neuropathy, 47 patients (47%) suffered from ocular complications, 42 (42%) suffered from kidney failure, 41 (41%) had cardiovascular problems, 16 (16%) had foot ulcers or infections, 26 (26%) had experienced heart failure, 10 (10%) had experienced stroke, 25 (25%) had skin problems, 46 (46%) suffered from digestive problems, and 34 (34%) dealt with other sorts of infections. The highest rate of complications reported in this analysis belonged to neuropathic problems, which were followed by ocular complications and digestive problems. According to **Table 5**, which shows the percentage of depression for each group, it can be said that the group with eyesight problems had the highest rate of depression. That is to say, 41 (87.2%) out of 47 patients with eyesight problems were depressed. Statistical studies also indicated that there is a significant statistical relationship between the percentage of complication and the degree of depression. That is to say, the more the complications caused by diabetes, the higher the rate of depression will be ($P<0.05$).

Table 1: Distribution of Depression in Diabetics and Non- Diabetics People

Subjects	Depressed	Normal	Total
diabetics	79 (79%)	21 (21%)	100
non- diabetics	61 (61%)	39 (39%)	100

Table 2: Distribution the Kind of Depression in Diabetics and Non- Diabetics

Subjects	Normal	Mild depression	Moderate depression	Severe depression	Total
Diabetics	21 (21%)	33 (33%)	31 (31%)	15 (15%)	100
non- diabetics	39 (39%)	41 (41%)	13 (13%)	7 (7%)	100

Table3: compares the Relationship Between Age and Depression

Subjects	Age	Depressed	Normal	Total
Diabetics	<50	31 (77.5%)	9 (22.5%)	40
	>50	48 (80%)	12 (20%)	60
Normal	<30	25 (47.16%)	28 (52.8%)	53
	30- 50	25 (78.12%)	7 (21.8%)	32
	>50	11 (73.3%)	4 (26.6%)	15

Table 4: Comparison Duration of Diabetes, Depression and Sex

Duration of diabetes	Female	Male	Depressed	Normal	Total
> 5	37 (56.1%)	12 (35.3%)	42 (85.7%)	7 (14.2%)	49
< 5	29 (43.9%)	22 (64.7%)	37 (72.5%)	14 (27.4%)	51

Table 5: Distribution of Complications from Diabetes in Diabetics People

Diabetic effect	Percent	Depressed	Normal	Total
Neuropathy	87 (87%)	69 (80%)	18 (20%)	87
Ocular complication	47 (47%)	41 (87.2%)	6 (12.8%)	47
Gastrointestinal problems	46 (46%)	37 (80.4%)	9 (19.6%)	46
Nephropathy	42 (42%)	35 (83.4%)	7 (16.6%)	42
Cardiovascular problems	41 (41%)	34 (82.9%)	7 (17.1%)	41
Other infections	34 (34%)	29 (85.3%)	5 (14.7%)	34
Myocardial infarction	26 (26%)	22 (84.6%)	4 (15.4%)	26
Skin problems	25 (25%)	18 (72%)	7 (28%)	25
Foot or leg infection	16 (16%)	13 (81.4%)	3 (18.6%)	16
Stroke	10 (10%)	8 (80%)	2 (20%)	10

DISCUSSION

In August 2010 a study named "analysis of the prevalence of depression among patients with type II DM" was conducted at a healthcare center in India. This study examined 300 diabetics, 147 of which were men (49%) and 153 were women (51%). The average duration of diabetes in these patients was 8 years **[17]**. This study revealed that there is a significant relationship between diabetes mellitus (DM) and depression. That is to say, 23% of the individuals met the criteria for severe depression, 54% suffered from moderate depression and 59% (178 individuals) were free from depression. This study showed that there is a strong relationship between depression and age ($P<0.05$). In addition, there was a significant relationship between depression and the following complications of diabetes: central obesity, nephropathy, neuropathy, the peripheral vascular disease (PVD), and diabetic foot. However, gender and duration of diabetes were significantly related to depression **[17]**. The findings of the present study were also consistent with the aforementioned findings while depression was also shown to have no relationship with age and gender. Nonetheless, depression was indicated to be significantly related to complications of diabetes. Furthermore, duration of diabetes also did not influence the test results.

In 2002, a study was performed at Imam Hussein and Loqman hospitals on 100 diabetics. The patients were studied using the Beck Depression Inventory (BDI) and were analyzed for their age, gender, usage of anti-depressants and experiences with complications of diabetes. 67.7% of the patients suffered from type I diabetes mellitus and 84.1% suffered from type II diabetes mellitus. There was no significant statistical difference between patients with type I and type II diabetes in terms of the four types of depression. 87.9% of the participants were depressed women and 64.3% were depressed men. It should be noted that the statistical difference between the two groups of participants was also significant ($P<0.05$). In addition, complications of diabetes were significantly related to depression ($P<0.01$) and duration of diabetes and age group were also significantly related to depression **[18]**.

In 2008, a total of 100 diabetics visiting the diabetes center of Shahroud city were studied at Shahroud University of Medical Sciences for symptoms of depression. This study revealed the existence of a significant relationship between the severity of depression and age ($P<0.01$). In addition, according to the results of the Beck test the prevalence of depression among diabetics was 87% and the majority of the depressed diabetics (32%) suffered from minimal depression. The results of this study suggest that the relationship of the severity of depression and age with duration of diabetes is not significant. Additionally, it was found out that 79% of diabetics suffered from depression and that the relationship of duration of diabetes and gender with depression was not significant **[19]**. However, in contrast to the results of the aforementioned research, the results of the present study suggest that the age of diabetics is not significantly related to the development of depression in them. This can be attributed to the age classification used in this research because patients were classified into the following 4 age groups: < 35 years old; 35-49 years old; 50-64 years old; and > 65 years old.

In the study performed by **[20]** in Athens a total of 310 diabetics (56% female and 46% male) were analyzed. The analysis indicated that the number of depressed diabetic women is 3 times the number of depressed diabetic men. Moreover, the relationship between depression and BMI growth was shown to be significant **[20]**. The results of the present study show a higher rate of depression in men. Therefore, these results comply with the results of the aforementioned study. In 2000, a study was carried out at diabetes clinic of Gorgan Training and Therapy Center. A total 150 diabetics were randomly selected for the purpose of this research, 100 of which had non insulin-dependent diabetes mellitus (NIDDM) and 50 of which had insulin-dependent diabetes mellitus (IDDM). This study revealed that 40.6% of the diabetics suffered from moderate to severe depression and that the relationship of age (P<0.014) and duration of diabetes (P<0.5) with depression is statistically significant. In addition, it was found out that depression in diabetics is not influenced by gender **[21]**. Our analysis suggests that duration of diabetes, age and gender are not related to depression. Therefore, the only complying results of these two analyses are the ones that suggest there is no relationship between gender and depression. In 2001, the relationship between depression and diabetes was studied in Sharjah (the United Arab Emirates). A total of 3047 individuals (64.4% female and 53.2% male) participated in this study. During the course of this study, complications such as retinopathy, the peripheral vascular disease, and neuropathy were observed in 24% of the diabetics. In addition, there was found to be an apparent relationship between complications of diabetes and depression **[22]**. Therefore, it can be said that the results of the aforementioned study comply with the results of the present study.

A total of 375 diabetics participated in a study carried out in the diabetes clinic of Doctor Shariati Hospital in Tehran and the Iranian Diabetes Association (2003). 41.9% of the participants were depressed: 23.7% suffered from severe depression, 9.3% had dysthymia, and 0.8% suffered from both of these disorders. Depression was found to be most prevalent in the 31-59 age group and in patients older than 60 years (P=0.03). Additionally, depression was more prevalent among female patients (P=0.001), patients with uncontrolled blood sugar, and patients experiencing systemic complications of diabetes **[23]**. Depression was more common in women than men and patients with more complications. However, there was no significant difference between the prevalence of depression among patients aging less or more than 50 years. Studies conducted by **[24]** indicated that there was a significant relationship between complications of diabetes (especially macrovascular complications, retinopathy, nephropathy, and sexual dysfunction) and depression **[24]**. The results of this study also are consistent with the results of the present study. In a study performed by Grandinti et al. on 574 native Hawaiian patients it was concluded that increase in the prevalence of depression is more common in diabetics. Moreover, it was found out that there is a relationship between depression and blood sugar in diabetics **[25]**. Hence, the results of their study are also in accordance with the results of the present study.

CONCLUSION

The present study suggested that a large percentage (79%) of patients with diabetes suffered from depression and that depression, as an important mental disorder, was more prevalent among diabetics with uncontrolled blood sugar and systemic complications. Poorly controlled blood sugar and lack of a suitable diet add to the severity of the disease and lead to the emergence of complications. Since depression disturbs the control of diabetes, more complications will emerge in such patients. The most common complications observed among these patients are retinopathy, cardiovascular problems, and nephropathy. Moreover, diabetes can cause the outbreak of depression regardless of age and gender and diabetics are prone to depression from the very beginning of their medical condition.

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