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Original Article

Psychiatric symptom rate of patients with Diabetes Mellitus: A case control study

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ABSTRACT

Aims: The aim of the study is comparing the psychiatric symptom in Type1 DM, Type 2 DM and controls. **Methods:** The study was designed as case control study and conducted between September 2011 and April 2012 to the Diabetes Clinic. Age, gender and education level matched 70 type 1 diabetics, 68 type 2 diabetics and 70 controls included to the study. SCL-90-R [Symptom Check List-90 (Revised)] test is used for determining the psychiatric symptom rates.

Results: It was found that the rate of somatization, interpersonal sensitivity, anger-hostility and additional scales were significantly different in type 1, type 2 diabetics and controls (($p = 0.023$, $p = 0.008$, $p = 0.018$ and $p = 0.039$, respectively). Compared to control group, being a patient with type 1 or type 2 Diabetes found as a risk factor for somatization, depression, anger-hostility and additional scales. Moreover being a patient with type 1 DM was found as a risk factor for having OBS symptoms ($p = 0.039$) and type 1 DM was protective against having interpersonal sensitivity symptoms ($p = 0.006$).

Conclusion: In diabetic patient groups, an increase in the rate of psychiatric symptoms was observed. Therefore a careful psychiatric examination is required in DM.

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1. Introduction

Diabetes is a chronic endocrine and metabolic disorder, which is characterized by complete or partial deficiency or peripheral ineffectiveness of insulin that is secreted from pancreatic beta cells [1]. Type 1 Diabetes Mellitus (DM) accounts for 5–10% of all diabetic population. It usually appears under the age of 35 and it affects most commonly the 10–15-year old age group. As a result of complete deficiency in insulin secretion and insulin use is mandatory for treatment. Type 2 DM, on the other hand, is the most common metabolic disorder in adult population [2].

The rate of psychiatric diseases and psychological symptoms are increased in diabetic patients [3]. Similar to the other chronic diseases in DM to maintain normal metabolic homeostasis, these

patients are obliged to use medicine, administer insulin and change their lifestyle, like performing regular exercises and having balanced diets. As a result of these obligations, diabetic patients are more prone to psychiatric disorders [4]. Moreover; acute and chronic complications of DM may also enhance anxiety and fear in diabetic patients. Depression is three times more common in type 1 diabetic children and two times more common in diabetic adults, in comparison to their peers [5]. Depression negatively affects the quality of life and psycho-social functions of diabetic patients, in addition to making compliance to the disease and treatment more difficult [6].

The aim of this study was to compare patients with type 1 and type 2 DM as well as controls according to psychiatric symptom frequency. The coincidence of psychiatric symptoms-diseases and diabetes negatively influences metabolic control, complications and as well as health quality. Early diagnosis and treatment, consultation in severe cases may support the management of diabetics. In this study the revised symptom screening test (SCL-90-R)

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was used rather than other diagnostic tests. Thus, the use of SCL-90-R made it possible to evaluate not only depression and anxiety in patients with DM but also other psychiatric symptoms such as somatization, OBS symptoms, interpersonal sensitivity, anger-hostility, phobic anxiety, psychotic symptoms, additional scales as well as the increase in overall symptom average.

1.1. Subjects

Seventy type 1 DM patients who were admitted consecutively between September 2011 and April 2012 to the Diabetes Clinic (31 males and 39 females) and age-, gender- and level of education level matched 68 patients with type 2 DM (30 males and 38 females) and 70 non-diabetic patients (31 males and 39 females) were included to the study.

2. Materials and methods

The rate of psychiatric symptoms was assessed by SCL-90-R [Symptom Check List-90 (Revised)] test. The SCL-90-R test was applied to each patient by the doctor during the visit.

The Symptom Checklist-90-Revised (SCL-90-R) is a 90-item self-report symptom inventory to measure psychological symptoms and psychological distress. It was designed to be appropriate for use with individuals from the community, as well as individuals with either medical or psychiatric conditions. The SCL-90-R assesses psychological distress in terms of nine primary symptom dimensions and three summary scores, termed as the global scores. Nine principal symptom dimensions are labeled as Somatization (SOM), Obsessive-Compulsive (OBS), Interpersonal Sensitivity (INT), Depression (DEP), Anxiety (ANX), Hostility (HOS), Phobic Anxiety (PHOB), Paranoid Ideation (PAR), and Psychoticism (PSY). The three summary scores are Global Severity Index (GSI), the Positive Symptom Distress Index (PSDI), and the Positive Symptom Total (PST).

The complaints were graded between 0 and 4 by using the SCL-90 self-report symptom inventory, which involves 90 items that indicate either a psychological or a physical symptom. The SCL-90-R self-report scale includes 10 subscales where each subscale has 6 to 13 items. Subscale scores were calculated by dividing the total sum of all scores from each item of that dimension by the number of items included in that dimension. Global Symptom Index (GSI) was calculated by dividing the sum of all scores from all items by the total number of items. (The mean scores of subscales or GSI may vary between 0 and 4 according to the severity of the symptom). Psychological symptom dimensions with a score >1 were accepted as pathologic [7]. The validity and reliability of Symptom Check List-90-R in Turkish population was previously confirmed by Dag et al. (1991) [8].

All statistical analyses were performed using the SPSS software version 15.0. Descriptive statistics for categorical variables are given as numbers and percent values. To compare independent categorical variables, the Chi-square tests were performed. When Chi-square test assumptions do not hold due to low expected cell counts, Monte Carlo Simulation for Multiple Comparisons was used. Comparison of subgroups was done using the Chi-square tests with Bonferroni correction. Again, when the application of the Chi-square test was not appropriate, Monte Carlo Simulation for Multiple Comparisons and Fisher's exact test statistics with Bonferroni correction were used. Possible factors identified with univariate analyses were further entered into the logistic regression analysis to determine independent risk factors, using the backward-stepwise method. A p-value of less than 0.05 was considered to show a statistically significant result.

3. Results

Seventy patients with type 1 diabetes, 68 patients with type 2 diabetes and 70 non-diabetic control patients were included in this study. There was no significant difference between these three groups in terms of demographic features. Patients with type 2 DM had significantly more co-morbid diseases and positive family histories of diabetes than the other groups ($p=0.007$ and $p=0.004$, respectively) (Table 1).

Table 2 summarizes the disease related features of type 1 and 2 diabetics. The duration of the disease, the treatment and HbA1c levels were significantly different between the type 1 and type 2 diabetic patient groups ($p<0.001$, $p<0.001$ and $p<0.001$, respectively). Type 2 diabetic patients with ≤ 5 years disease duration were using anti-diabetic agents more frequently. Patients with type 2 diabetes demonstrated increased rate of diabetes-related hospitalization and complications compared to the patients with type 1 diabetes ($p<0.001$ and $p=0.002$, respectively).

Type 1 diabetics, type 2 diabetics and controls were significantly different for the rate of somatization, interpersonal sensitivity, anger-hostility and additional scales ($p=0.023$, $p=0.008$, $p=0.018$ and $p=0.039$, respectively) (Table 3). Eleven factors (gender, age, education level, marriage status, child count, smoking status, type of DM, HbA1c level, psychiatric disease treatment, family history of DM and psychiatric disease) were evaluated as risk factors for each parameters of SCL-90-R, given in Table 4.

According to the psychiatric symptom screening results, compared to control group, being a patient with type 1 or type 2 DM was found as a risk factor for somatization, depression, anger-hostility and additional scales. Moreover being a patient with type 1 DM was found as a risk factor for having OBS symptoms ($p=0.039$). On the other hand, being a patient with type 1 DM was found protective against having interpersonal sensitivity symptoms ($p=0.006$). Table 5 shows SCL-90-R screening test parameters in the evaluation of the protective factors.

4. Discussion

We found out that type 1 diabetic patients revealed statistically significant differences for somatization, OBS symptoms, interpersonal sensitivity, anger-hostility, phobic anxiety, psychotic symptoms, additional scales and overall symptom average compared with controls. On the other hand symptoms related to somatization, interpersonal sensitivity, anger-hostility and additional scales were found significantly more frequent in patients with type 2 DM in comparison to the patients in the control group.

Maia et al. (2012) assessed the prevalence of psychiatric disorders in patients with type 1 and type 2 DM. They found that at least 1 psychiatric disorder existed in 42.5% of all diabetic patients. Generalized anxiety disorder (21%) was the most common psychiatric disorder, which is followed by dysthymia (15%), social phobia (7%), and current depression (5.5%). Many disorders like dysthymia, current depression, and panic disorder were significantly higher in patients with type 1 DM [9]. Those results were supported by a number of studies which were performed in patients with diabetes [10,11]. Furthermore, the prevalence of some psychiatric disorders such as the panic disorder, social anxiety, agoraphobia, and mood disorders is higher in diabetic patients in comparison to the general population [12,13].

Increased glucose levels and diabetic complications were independent risk factors for those psychiatric disorders [13]. In another study from USA, the high prevalence of co-morbid disorders and the persistence of depressive affect and diabetes distress over time highlight the need for both repeated mental health and diabetes distress screening at each patient contact, not just periodically,

Table 1
Demographic features of the groups.

	Age	Type 1 DM (n = 70)(%)	Type 2 DM (n = 68)(%)	Control (n = 70)(%)	p
Age group (years)	20–29	4 (5.7)	4 (5.9)	4 (5.7)	1.000
	30–39	22 (31.4)	22 (32.4)	22 (31.4)	
	40–49	24 (34.3)	23 (33.8)	24 (34.3)	
	50–59	16 (22.9)	15 (22.1)	16 (22.9)	
	60	4 (5.7)	4 (5.9)	4 (5.7)	
Sex	Female	39 (55.7)	38 (55.9)	39 (55.7)	1.000
	Male	31 (44.3)	30 (44.1)	31 (44.3)	
Level of Education	Primary school (≤ 5 years)	26 (37.1)	26 (38.2)	26 (37.1)	1.000
	Secondary school (≤ 8 years)	2 (2.9)	2 (2.9)	2 (2.9)	
	High school (≤ 12 years)	18 (25.7)	18 (26.5)	19 (27.1)	
	University	24 (34.3)	22 (32.4)	23 (32.9)	
Work status	Unemployed	41 (58.6)	39 (57.4)	37 (52.9)	0.773
	Employed	29 (41.4)	29 (42.6)	33 (47.1)	

Table 2
Disease related parameters of type 1 and type 2 diabetics.

		Type 1 DM (n = 70)(%)	Type 2 DM (n = 68)(%)	p
Disease duration (years)	≤ 5	14 (20.0)	47 (69.1)	<0.001
	>5	56 (80.0)	21 (30.9)	
Treatment	Insulin	63 (90.0)	5 (7.4)	<0.001
	OAD*	1 (1.4)	59 (86.8)	
	Insulin + OAD*	6 (8.6)	4 (5.9)	
HbA1C (%)	≤ 7	14 (20.0)	39 (57.4)	<0.001
	>7	56 (80.0)	29 (42.6)	
History of diabetes-related hospitalization		41 (58.6)	5 (7.4)	<0.001
Diabetes-related complications		22 (31.4)	7 (10.3)	0.002

* OAD; Oral antidiabetics.

Table 3
Comparison of type 1 diabetics, type 2 diabetics and controls by the SCL-90-R test.

		Type 1 DM (n = 70)	Type 2 DM (n = 68)	Control (n = 70)	p
Somatization	0–1	38 (54.3)	25 (36.8)	43 (61.4)	0.023
	1.01–1.50	12 (17.1)	19 (27.9)	16 (22.9)	
	≥ 1.51	20 (28.6)	24 (35.3)	11 (15.7)	
OBS symptoms	0–1	35 (50.0)	37 (54.4)	43 (61.4)	0.367
	1.01–1.50	15 (21.4)	15 (22.1)	17 (24.3)	
	≥ 1.51	20 (28.6)	16 (23.5)	10 (14.3)	
Interpersonal sensitivity	0–1	43 (61.4)	39 (57.4)	56 (80.0)	0.008
	1.01–1.50	9 (12.9)	17 (25.0)	8 (11.4)	
	≥ 1.51	18 (25.7)	12 (17.6)	6 (8.6)	
Depression	0–1	38 (54.3)	39 (57.4)	49 (70.0)	0.279
	1.01–1.50	10 (14.3)	12 (17.6)	9 (12.9)	
	≥ 1.51	22 (31.4)	17 (25.0)	12 (17.1)	
Anxiety	0–1	51 (72.9)	52 (76.5)	60 (85.7)	0.084
	1.01–1.50	10 (14.3)	4 (5.9)	2 (2.9)	
	≥ 1.51	9 (12.9)	12 (17.6)	8 (11.4)	
Anger-hostility	0–1	44 (62.9)	46 (67.6)	59 (84.3)	0.018
	1.01–1.50	8 (11.4)	6 (8.8)	7 (10.0)	
	≥ 1.51	18 (25.7)	16 (23.5)	4 (5.7)	
Phobic anxiety	0–1	64 (91.4)	60 (88.2)	67 (95.7)	0.630
	1.01–1.50	1 (1.4)	2 (2.9)	1 (1.4)	
	≥ 1.51	5 (7.1)	6 (8.8)	2 (2.9)	
Paranoid ideation	0–1	43 (61.4)	41 (60.3)	54 (77.1)	0.205
	1.01–1.50	9 (12.9)	10 (14.7)	7 (10.0)	
	≥ 1.51	18 (25.7)	17 (25.0)	9 (12.9)	
Psychotic symptoms	0–1	60 (85.7)	54 (79.4)	63 (90.0)	0.276
	1.01–1.50	3 (4.3)	8 (11.8)	4 (5.7)	
	≥ 1.51	7 (10.0)	6 (8.8)	3 (4.3)	
Additional scales	0–1	42 (60.0)	39 (57.4)	56 (80.0)	0.039
	1.01–1.50	10 (14.3)	8 (11.8)	5 (7.1)	
	≥ 1.51	18 (25.7)	21 (30.9)	9 (12.9)	
Overall symptom average	0–1	44 (62.9)	42 (61.8)	57 (81.4)	0.088
	1.01–1.50	14 (20.0)	13 (19.1)	6 (8.6)	
	≥ 1.51	12 (17.1)	13 (19.1)	7 (10.0)	

Bold indicates $p < 0.05$.

Table 4
SCL-90-R screening test parameters in the evaluation of the risk factors.

SCL-90-R parameters	Determined risk factors	P
Somatization	Female gender	0,001
	Children count <3	0,006
	Children count ≥3	0,027
	Type 1 DM (vs controls)	0,014
OC Symptoms*	Type 2 DM (vs control)	0,002
	Female gender	0,007
	Type 1 DM (vs control)	0,039
Interpersonal Sensitivity	Family history of psychiatric diseases	0,018
	Type 1 DM (vs control)	0,039
Depression	Psychiatric treatment	0,013
	Type 1 DM (vs control)	0,016
	Type 2 DM (vs control)	0,040
Anxiety	Psychiatric treatment	0,021
Anger-hostility	Type 1 DM (vs control)	0,001
	Type 2 DM (vs control)	0,002
Phobic anxiety	Psychiatric treatment	0,004
	Type 2 DM (vs control)	0,041
Paranoid ideation	Female gender	0,037
	Type 2 DM/vs control)	0,035
	Employed	0,009
Psychoticism	N/S	
Additional scales	Type 1 DM (vs control)	0,033
	Type 2 DM (vs control)	0,003
Global severity index	Psychiatric treatment	0,031

* OC Symptoms: Obsessive-compulsive symptoms.

particularly for younger adults, women and those with complications/comorbidities [14]. Their results were in line with those in other studies, where an existing association with the duration of diabetes was reported [15].

Higher prevalence of psychiatric disorders such as depression may associate with age, gender, income and level of education and geographic differences [16,17]. Depression and anxiety are more common in female than male and a younger age is associated with a higher prevalence of depression compared to older patients. We reached similar results in our study. We found being younger than 30 years old as a risk factor for a lot of psychiatric symptoms. Similarly, lower income and low level of education levels are independent risk factors associated with increased depressive symptoms. Moreover, being female gender is a risk factor for somatization, OBS symptoms and paranoid ideation.

In conclusion, there was no statistically significant difference among patients with type 1 or type 2 DM in terms of psychiatric symptoms. However if type 1 and type 2 diabetics compared one by one with control, it was found that symptoms related to somatization, interpersonal sensitivity, anger-hostility and additional scales were found significantly more frequent in patients with type 2 diabetics; and somatization, OBS symptoms, interpersonal sensitivity, anger-hostility, phobic anxiety, psychotic symptoms, additional scales and overall symptom average were statistically

Table 5
SCL-90-R screening test parameters in the evaluation of the protective factors.

SCL-90-R parameters	Determined protective factors	P
Somatization	30-39 age group compared to 20-29 age group	0,003
	40-49 age group compared to 20-29 age group	<0,001
	50-59 age group compared to 20-29 age group	<0,001
	≥60 years old age group compared to 20-29 age group	0,007
OC Symptoms	University compared to primary school	<0,001
Interpersonal Sensitivity	30-39 age group compared to 20-29 age group	0,002
	40-49 age group compared to 20-29 age group	<0,001
	50-59 age group compared to 20-29 age group	0,001
	≥60 years old age group compared to 20-29 age group	0,008
	University compared to primary school	0,013
	30-39 age group compared to 20-29 age group	0,002
Depression	40-49 age group compared to 20-29 age group	<0,001
	50-59 age group compared to 20-29 age group	0,002
	≥60 years old age group compared to 20-29 age group	0,013
	University compared to primary school	0,002
	30-39 age group compared to 20-29 age group	0,042
	40-49 age group compared to 20-29 age group	0,003
Anxiety	50-59 age group compared to 20-29 age group	0,010
	University compared to primary school	0,003
	30-39 age group compared to 20-29 age group	0,002
	40-49 age group compared to 20-29 age group	<0,001
Anger -hostility	50-59 age group compared to 20-29 age group	0,001
	≥60 years old age group compared to 20-29 age group	0,018
	University compared to primary school	0,016
	30-39 age group compared to 20-29 age group	0,014
	40-49 age group compared to 20-29 age group	0,008
	50-59 age group compared to 20-29 age group	0,014
Phobic Anxiety	Children count ≥ 3	0,027
	University compared to primary school	0,004
Paranoid Ideation	N/S	
Psychoticism	30-39 age group compared to 20-29 age group	<0,001
	40-49 age group compared to 20-29 age group	<0,001
	50-59 age group compared to 20-29 age group	0,001
	≥60 years old age group compared to 20-29 age group	0,009
	University compared to primary school	<0,001
	30-39 age group compared to the 20-29 age group	0,001
Additional scales	40-49 age group compared to the 20-29 age group	<0,001
	50-59 age group compared to the 20-29 age group	<0,001
	50-59 age group compared to the 20-29 age group	<0,001
	University compared to primary school	0,010
Global Severity Index	30-39 age group compared to the 20-29 age group	0,001
	40-49 age group compared to the 20-29 age group	<0,001
	50-59 age group compared to the 20-29 age group	<0,001
	University compared to primary school	0,010

significant different in type 1 diabetics. These results indicate the importance of psychiatric evaluation in patients with type 1 and type 2 DM.

The strength of this study was the use of the revised symptom screening test (SCL-90-R) rather than other diagnostic tests was preferred in this study. Thus, the use of SCL-90-R made it possible to evaluate not only depression and anxiety in patients with DM but also other psychiatric symptoms such as somatization, OBS symptoms, interpersonal sensitivity, anger-hostility, phobic anxiety, psychotic symptoms, additional scales as well as the increase in overall symptom average. Moreover, to our knowledge, this is the first study analyzing both the frequency of various psychiatric symptoms and their predictive factors in a diabetic population in Turkey.

Although our results seem to be consistent with those of the mentioned studies, use of a screening test it may be assumed that it is not appropriate to compare the results directly with the studies above, but on the other hand as the psychiatric symptoms are indicators for psychiatric diseases, it is meaningful to compare these results with the existing data.

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