Quality of Life and Psychiatric Symptoms in the Patients with Type 2 Diabetes Mellitus

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ABSTRACT

Quality of life and psychiatric symptoms in the patients with type 2 diabetes mellitus

Objective: The purpose of this study is to measure the depression and anxiety levels, to investigate their associations with sociodemographic variables and to emphasize the importance of multidisciplinary approach for the follow up and treatment of patients with type 2 diabetes mellitus (DM).

Method: We enrolled randomly selected 100 consecutive patients with type 2 DM, admitted to the outpatient clinic of endocrinology. Age, gender and marital status matched 100 volunteers served as control group. Sociodemographic data form and Hospital Anxiety and Depression Scale (HAD), Short Form-36 (SF–36) were performed for all participants.

Results: For SF–36, all subscale mean scores were found to be lower in type 2 DM patients as compared to control group. HAD-Anxiety (HAD-A) and HAD-Depression (HAD-D) mean scores in the group of patients were found to be higher than the mean scores of the control group. The difference was significant for HAD-D, whereas negligible for HAD-A. In both patient and control groups, subscales of life quality were found to be negatively correlated with both depression and anxiety. Comparing the HAD-A and the HAD-D mean scores according to the gender, both subscale mean points were higher in female than male in both groups. When the SF-36 subscale scores for males and females were compared, it was found that females have lower scores in all the subscales. HAD-A and HAD-D mean scores were found to be positively correlated with the duration of diabetes, however, this correlation was not statistically significant.

Conclusions: In this study, it was found that type 2 DM have extremely deteriorated the quality of life of the patients and caused many psychological signs accompanying clinic. Thus, our study has shown the necessity of consultation and emphasizes the liaison for clinics.

Key words: Type 2 diabetes mellitus, psychiatric symptoms, quality of life

ÖZET

Tip 2 diyabetes mellituslu hastalarda yaşam kalitesi ve ruhsal belirtiler

Amaç: Bu çalışmanın amacı, tip 2 Diabetes Mellitus (DM) tanılı hastalarda depresyon ve anksiyete düzeyleri ile sosyodemografik değişkenler arasındaki ilişkiyi araştırmak ve tip 2 DM'li hastaların tedavisi için multidisipliner yaklaşımın önemini vurgulamaktır.

Yöntem: Çalışmaya, Karadeniz Teknik Üniversitesi Tıp Fakültesi Farabi Hastanesi Endokrinoloji polikliniğinde, tip 2 DM tanısı ile izlenen, ardışık poliklinik başvuruları olan hastalar arasından seçilen 100 hasta dahil edildi. Yüz kişilik gönüllü kontrol grubu, yaş, cinsiyet, medeni durum açısından hasta grubuyla eşleştirilerek oluşturuldu. Tüm katılımcılara, sosyodemografik veri toplama formu, Hastane Anksiyete ve Depresyon Ölçeği (HAD) ve Kısa Form-36 (SF-36) uygulandı.

Bulgular: Tip 2 DM'li hastalarda, kontrol grubuna göre, SF-36 alt ölçeklerinin tümünün ortalama puanlarının daha düşük olduğu bulundu. HAD Anksiyete (HAD-A) ve HAD Depresyon (HAD-D) ortalama puanları karşılaştırıldığında, diyabetli hastaların ortalama puanlarının kontrollerinkine göre daha yüksek olduğu belirlendi. Bu fark HAD-D için anlamlı iken HAD-A için anlamlı değildi. Hasta ve kontrol grubunda, depresyon ve anksiyete düzeyleri ile yaşam kalitesi alt alanları arasında negatif yönde bir ilişki olduğu belirlendi. Cinsiyete göre HAD-A ve HAD-D ortalama puanları karşılaştırıldığında, her iki grupta da kadınların her iki alt ölçek ortalama puanlarının erkeklerin puanlarına göre daha yüksek olduğu tespit edildi. Cinsiyet ile SF-36 alt alan puanları arasındaki ilişkiye bakıldığında, kadınlarda yaşam kalitesi alt alanlarının tümünde, alınan ortalama puanların erkeklerinkine göre daha düşük olduğu saptandı. Hastalarda, diyabet sürelerine göre HAD-A ve HAD-D ortalama puanları karşılaştırıldığında, diyabet süresi arttığında HAD-A ve HAD-D ortalama puanlarının arttığı, ancak bu artışın istatistiksel olarak anlamlı olmadığı saptanmıştır.

Sonuç: Bu çalışmada, diyabetin hastaların yaşam kalitesini son derece olumsuz etkilediği ve tip 2 diyabetli hastalarda çok sayıda ruhsal belirtinin klinik tabloya eşlik ettiği saptanmıştır. Çalışmamız, klinikler arasında konsültasyonun ve liyezonun gerekliliğini ortaya koymaktadır.

Anahtar kelimeler: Tip 2 diabetes mellitus, ruhsal belirtiler, yaşam kalitesi

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INTRODUCTION

Diabetes Mellitus (DM) is a chronic somatic disease of the endocrine system which can affect several systems and may lead to mental, emotional, social and psychosexual problems and conflicts from patient's perspective (1,2). Psychiatric symptoms concomitant with diabetes affect clinical presentation, severity and

course of the disease and response to treatment. For this reason, comprehensive management of diabetic patients is important. Psychiatric symptom and disease rates are high in diabetic patients when compared to general population. Most prevalent psychiatric disorders seen in type 2 DM are depression, anxiety disorders, alcohol and substance dependence and eating disorders (2). Lifetime prevalence of depression in these patients were reported 14.4-32.5% and anxiety symptoms were also seen in 40% of the patients (3,4). Psychiatric symptoms and disorders are related with treatment adherence, difficulty in metabolic control and consequent micro- and macrovascular complications in diabetic patients. There are studies reported that depression is seen 3-4 times higher in type 2 DM patients than general population (2,3). In a study done in Turkey, major depressive disorder was reported more prevalent in cases with poor metabolic control than cases with better metabolic control (4). Similarly, glycemic control was reported to be poorer in depressive diabetic patients than non-depressive diabetic patients in other relevant studies (5-10). Course of depression is generally chronic. Even after an effective treatment, recurrence rate is in 80% of type 2 DM patients and mean 4 episodes develop in 5 years time. However, depression is diagnosed and treated in only one third of diabetic patients (2,10). Depression doubles the risk of type 2 DM occurrence independent from other relevant risk factors (11,12). A recent meta-analysis of related studies showed that there is a significant correlation between type 2 DM complications and depressive symptoms (3). Both type 2 DM complications and hyperglycemia are related with inadequate response to treatment of depression and this increases risk of recurrence. Most appropriate treatment of depression in diabetic patients is possible with concomitant and serious evaluation of psychiatric symptoms in addition to metabolic control. Patients with depression carry a higher risk of type 2 DM due to both reduced physical activity and high calorie diet and tobacco use. On the other hand, it was shown that metabolic problems of type 2 DM (hypoglycemia and hyperglycemia, in increasing order) may lead to depressive symptoms in patients. There is evidence showing that diabetes may cause white matter changes in the brain and if these white matter abnormalities occur in the region of brain which regulates mood (i.e., limbic system) then this may have a role in development of depression. Etiology of white matter changes is not clearly known but it may be related with diabetic vascular disease (3).

Although its relation with diabetes is not well investigated, in some studies, anxiety disorders were seen more in adults with type 2 DM than general population and this may be correlated with poor metabolic control. Similar to results with depression, it was reported that anxiety symptoms are seen more in women and people with low socio-economic status (2). In Turkey, in the study of Bahar et al. (13), it was reported that mean depression scores increase by declining age, anxiety and depression scores statistically and significantly increase by decreasing educational level and mean anxiety scores of patients with low economic status were found higher. Advances in treatment of disease by developing medical care lead to increase in mean life expectancy and efforts to improve quality of life in patients with chronic disease. In studies to evaluate effects of different treatment methods, symptom severity or complications in diabetic patients on quality of life, it was reported that quality of life is negatively affected (11,12,14).

In our study, we aimed to investigate the relationship between psychiatric symptoms and quality of life, socio-demographic variables and disease variables in patients with type 2 DM.

METHODS

Sample

This is a case-control study. Cases included in the study were selected from consecutive patients who were followed-up for type 2 DM and admitted to endocrinology outpatient clinic of Karadeniz Technical University Medical School between January 1 and March 31, 2007. Required permission was taken from local ethical council before study commenced. A total of 100 patients were recruited who accepted to

participate in the study after appropriate information about the aim and rationale of the study was given and who signed informed consent form. Patients who had history of a psychotic disorder and dementia and had a psychiatric disorder and used psychotropic medication in the past 6 months were excluded from the study. Patients who did not have educational level which avoided them from understanding tests and having mental or social retardation were also excluded from the study. Control group consisted of people working in the hospital or patients' relatives who volunteered to participate in the study after being informed about the aim and rationale of the study. The members of the control group had no psychiatric disorder and treatment and they matched the same characteristics with the patients such as age, gender and marital status. All volunteers completed the study.

Assessment Tools

Socio-demographic Data Form: A form prepared by investigators to collect socio-demographic information considering the aim of the study was used.

Hospital Anxiety and Depression Scale (HAD): This is a self-rating scale developed for determining and assessing level and change of severity of anxiety and depression risk in patients with somatic diseases who were admitted to the first level healthcare facilities. The scale was developed by Zigmond and Snaith and provides quadruple Likert type assessment, contains 14 questions and 7 of them (odd numbers) assess anxiety and remainder 7 questions (even numbers) assess depression (15). Validity and reliability study of the scale was done by Aydemir et al. (16) and reported to be reliable to detect anxiety and depression in patients with somatic diseases. Cut-off scores were found 10/11 for anxiety sub-scale (HAD-A) 7/8 for depression sub-scale (HAD-D) in studies performed in Turkey. According to these results, getting a score higher than these scores is determined as being under risk. Lowest score which can be taken from both scales is 0 and highest score is 21 (15).

Short Form-36–SF-36: This form was developed and released by Rand Corporation (17) and is a self-rating

scale to assess quality of life and having a generic measure characteristic. It was specifically developed to assess quality of life in patients with somatic diseases. However, it is used with success in healthy people and people with psychiatric diseases as well. It evaluates both negative and positive aspects of health status and is very sensitive to detect tiny changes in disability. SF-36 evaluates physical function, role limitations (due to physical and emotional problems), social functioning, mental health, vitality (energy), pain and 8 dimensions of general health in 36 items. Scale does not have a raw score and only total score of 8 sub-dimensions is calculated. Scores of sub-scales are between 0 and 100 and higher score shows a better health status. Total score calculation of the scale is not of consideration. Validity and reliability study of the Turkish version was done by Koçyiğit et al. (18).

Statistical Analysis

Data collected in this study were analyzed by SSPS for Windows 10.0 database program. Consistency of data collected with normal distribution was assessed by Kolmogorov Smirnov test at each group. Analyses of variables consistent with normal distribution were done by Student's t-test and analyses of variables inconsistent with normal distribution were done by Mann Whitney U test. Analyses of qualitative data were performed by chi-square test. Data collected by assessment were shown as arithmetical mean ± standard deviation, data collected by counting were shown as numbers (%). Multiple linear regression analysis was performed because each sub-scale of SF-36 consisted of dependent variables and to investigate effects of variables which may have an impact on quality of life (age, gender, educational level, income level, depression and anxiety levels). In order to determine factors which explained changes in SF-36 subscale scores best (in other words, to create an optimum model), Multiple Stepwise Regression Analysis was performed by taking changes at each SF-36 subscale scores as dependent variables and status in case group, age, gender, educational level (not having formal education, primary school, high school or over), income level (<404, 404-807, >807 TL/

month), depression (HAD-D) and anxiety (HAD-A) levels as independent variables. Data were presented as R, corrected R2, estimated relative risk (Odds ratio-B) and 95% confidence interval (CI). Significance level was taken as p<0.05.

RESULTS

One hundred people from patient group diagnosed as type 2 DM and 100 people from control group completed the study. Mean age of the control group was 53.9±7.44 and mean age of the patient group was 55.7±7.14. Distribution of socio-demographic characteristics of study groups are shown in table 1 (Table 1). Disease duration was between 1 and 30 years in the patient group and mean duration was 11.06±7.20 years. Mean HAD and SF-36 values of patient and control groups are shown in table 2 (Table 2). According to this, mean HAD-A subscale score was 7.09±4.82 in the patient group and 6.92±4.15 in the control group and this difference between two groups was not statistically significant (p=0.863). Mean HAD-D score was 7.33±4.85 in the patient group and 5.58±3.33 in the control group and this difference between two groups

Table 1: Distribution of socio-demographic characteristics of study groups

	Type 2 DM (n=100) n (%)	Control (n=100) n (%)	χ^2	p
Gender			0.02	0.888
Woman	50 (50%)	51 (50.5%)		
Man	50 (50%)	49 (49.5%)		
Marital Status			1.52	0.217
Married	88 (88%)	94 (94%)		
Single/Other	12 (12%)	6 (6%)		
Educational Level			13.69	<0.001
Not formally educated	30 (30%)	11 (11%)		
Primary School	39 (39%)	38 (38%)		
High school or over	31 (31%)	51 (51%)		
Economic Status			29.46	<0.001
<404 TL/month	9 (9%)	2 (2%)		
404–807 TL/month	47 (47%)	17 (17%)		
≥807 TL/month	44 (44%)	81 (81%)		
	Mean±S.D.	**Mean±S.D.**		
Mean age (years)	55.7±7.14	53.9±7.44	t= 1.65	0.099

χ^2, Chi-square test; t, Student's t test

Table 2: Distribution of HAD and SF–36 scores to the groups

	Type 2 DM (Mean±S.D.)	Control (Mean±S.D.)	χ^2	p
HAD-A	7.09±4.82	6.92±4.15	0.98	0.863
HAD-D	7.33±4.85	5.58±3.33	7.76	0.003
SF–36 Subscales			**t/z***	
Physical Function	61.45±29.00	77.30±21.71	-4.004*	<0.001
Physical Role Difficulty	38.25±42.26	79.75±32.51	-6.797*	<0.001
Pain	61.40±58.89	67.16±19.72	-2.659*	0.008
General Health	44.37±27.04	61.10±17.78	-5.170	<0.001
Energy	50.80±28.70	62.10±16.43	-3.417	<0.001
Social Function	64.38±33.35	77.25±17.71	-2.011*	0.044
Emotional role diffculty	39.00±40.22	73.00±38.69	-5.530*	<0.001
Mental Health	57.84±21.15	66.96±13.93	-3.600	<0.001

χ^2, Chi-square test; t, Student's t test; z*, Mann-Whitney U test
HAD-A (Hospital Anxiety and Depression Scale-Anxiety Subscale)
HAD-D (Hospital Anxiety and Depression Scale-Depression Subscale)
SF–36(Short Form-36)

Table 3: Distribution of study groups to over- and sub-threshold scores according to depression-anxiety

	Type 2 DM (n=100) n (%)	Control (n=100) n (%)	χ²	p
HAD-A			0.98	0.408
Sub-threshold (0-10 points)	73 (73.0)	79 (79.0)		
Over-threshold (11-21 points)	27 (27.0)	21 (21.0)		
HAD-D			7.76	0.006
Sub-threshold (0-7 points)	53 (53.0)	72 (72.0)		
Over-threshold (8-21 points)	47 (47.0)	28 (28.0)		

χ², Chi-square test

Table 4: Comparison of HAD and SF-36 scores in patients and control groups according to gender

	Patient				Control			
	Woman (Mean±S.D.)	Man (Mean±S.D.)	χ²	p	Woman (Mean±S.D.)	Man (Mean±S.D.)	χ²	p
HAD-A	9.28±4.89	4.90±3.64	8.57	<0.001	9.10±3.92	4.65± 3.06	8.12	<0.001
HAD-D	9.50±4.92	5.16±3.73	17.70	<0.001	6.69±3.41	4.43± 2.85	10.88	<0.001
SF–36			t/z*	p			t/z*	p
Physical function	48.00±27.44	74.90±24.04	-4.739*	<0.001	68.04±24.76	86.94±12.15	-4.339*	<0.001
Physical role difficulty	18.00±33.52	58.50±40.60	-5.015*	<0.001	69.61±37.52	90.31±22.14	-4.015*	<0.001
Pain	57.54±78.87	65.26±27.51	-2.824*	0.005	58.12±17.27	76.57±17.74	-3.573*	<0.001
General health	37.14±27.40	51.60±24.89	-2.762	0.007	54.35±19.37	68.12±12.75	-3.273	<0.001
Energy	36.60±27.21	65.00±22.63	-5.674	<0.001	56.57±17.25	67.86±13.42	-3.973	<0.001
Social function	56.75±35.28	72.00±29.73	-2.189*	0.029	71.32±19.73	83.42±12.86	-2.824*	<0.001
Emotional role	22.67±32.60	55.33±40.75	-4.046*	<0.001	62.09±42.17	84.35±31.26	-2.239*	0.003
Mental health	50.00±22.59	65.68±16.85	-3.973	<0.001	64.86±16.40	69.14±10.52	1.53	0.125

χ², Chi-square test; t, Student's t test; z*, Mann-Whitney U test
HAD-A (Hospital Anxiety-Depression Scale-Anxiety subscale)
HAD-D (Hospital Anxiety-Depression Scale-Depression subscale)

was statistically significant (p=0.003). In the patient group, among SF-36 subscales, lowest performance was found in physical role difficulty domain (38.25±42.26), highest performance was found in social functioning domain (64.38±33.35); in the control group, lowest performance was found in general health domain (61.10±17.78) and highest performance was found in physical role difficulty domain (79.75±32.51).

Twenty-seven cases from patient group and 21 cases from control group received over-threshold scores from HAD-A (p=0.408). Forty-seven cases from patient group and 28 cases from control group received over-threshold scores from HAD-D (p=0.006). Distribution of study groups according to over- and sub-threshold scores for depression and anxiety are shown in table 3 (Table 3).

When difference between genders in the patient group is considered, mean HAD-A (p<0.001) and HAD-D (p<0.001) scores were found higher in women

and this difference was statistically significant. In SF–36 sub-scales, scores were significantly too low at all domains (p<0.001). When men and women in the control group were compared, scores from all domains except SF-36 mental health (p=0.125) were found lower in women and the difference was statistically significant (p<0.001) (Table 4).

When duration of DM and mean HAD-A (p=0.073) and mean HAD-D (p=0.059) scale scores were compared, mean depression and anxiety scores increased by increasing DM duration but no significant difference was found between them (Table 5). When correlation between disease duration and quality of life was evaluated, there was a negative correlation between disease duration and sub-domains of physical role difficulty, pain, general health, energy, social function and mental health and also quality of life decreased by increasing disease duration. Among quality of life sub-domains, decreases at all domains except emotional

Table 5: Comparison of HAD and SF-36 scores in the patient group according to disease duration

	Less than 10 years Type 2 DM (Mean±S.D.)	Over 10 years Type 2 DM (Ortalama±S.D.)	χ^2	p
HAD-A	6.11±4.47	7.86±4.99	3,10	0.073
HAD-D	6.30±4.93	8.14±4.68	7.70	0.059
SF–36 Subscales			**t/z***	
Physical Function	68.07±27.22	56.25±29.55	2.05	0.147
Physical role difficulty	44.89±42.99	33.04±41.32	-1.45*	0.043
Pain	70.39±81.99	54.34±29.54	-1.02*	0.304
General health	50.43±23.70	39.61±28.71	2.08	0.046
Energy	55.80±27.74	46.88±29.07	1.55	0.123
Social Function	72.16±28.00	58.26±36.09	2.10	0.033
Emotional role difficulty	43.94±43.60	35.12±37.30	-0.82*	0.408
Mental Health	62.18±19.55	54.43±21.91	1.84	0.069

χ^2, Chi-square test; t, Student's t test; z*, Mann-Whitney U test
HAD-A (Hospital Anxiety-Depression Scale-Anxiety subscale)
HAD-D (Hospital Anxiety-Depression Scale-Depression subscale)
SF–36(Short Form-36)

Table 6: Results of Pearson correlation analysis between age, anxiety and depression levels and SF-36 scores in the patient group

		Age	Disease Duration	HAD-A	HAD-D
HAD-A	r	0.07	0.19*	-	0.65***
HAD-D	r	0.14	0.26**	0.65***	-
Physical function	r	-0.15	-0.26**	-0.56***	-0.64***
Physical role difficulty	r	-0.02	-0.20*	-0.52***	-0.53***
Pain	r	-0.14	-0.22*	-0.34***	-0.36***
General health	r	-0.08	-0.27**	-0.44***	-0.51***
Energy	r	-0.07	-0.22*	-0.63***	-0.73***
Social function	r	-0.16	-0.28**	-0.53***	-0.56***
Emotional role	r	0.01	-0.13	-0.43***	-0.49***
Mental health	r	-0.05	-0.27**	-0.57***	-0.62***

*p<0.05, **p<0.01, ***p<0.001

role difficulty (r=-0.13, p=0.205) were statistically significant (phys func r=-0.26, p=0.009; phys role r=-0.20, p=0.042; pain r=-0.22, p=0.030; general health r=-0.27, p=0.008; energy r=-0.22, p=0.028; soc func r=-0.28, p=0.006; ment heal r=-0.27, p=0.006) (Table 6).

According to Multiple Linear Regression Analysis used in the study, variables having the largest effect on physical function were HAD-D score, HAD-A score and gender, consecutively. In the patient group, results of Multiple Linear Regression Analysis used to evaluate factors affecting SF–36 sub-domains are shown in Table 7 (Table 7). According to these results, only being a type 2 diabetic, HAD-A score, HAD-D score and male gender had statistically significant impact on physical function.

DISCUSSION

In our descriptive and cross-sectional study, we found that diabetic patients had higher prevalence of psychological symptoms and lower quality of life compared to control group. It is noteworthy that psychiatric symptom and disorder rates found in diabetic patients in several studies done worldwide support our results (19,20). In a study about prevalence of depression in diabetic patients, depression prevalence was reported 33% (21). In a study done in Turkey, major depressive disorder was found in 58.9% of diabetic patients according to DSM-IV criteria and in another study, major depressive disorder was reported in 15% of diabetic patients during interview (4,22). In another study done with PHQ-9 (Patient Health

Table 7: Results of Multiple Stepwise Regression Analysis of Factors Affecting SF-36 Subscales

Dependent Variables	Independent Variables*	B	Std. Error	Std. (B)	t	p	95%Confidence Interval (B) Alt Sınır	Üst Sınır
Physical Function	Being in the case group	-9.358	2.948	-0.175	3.174	0.002	-15.173	-3.542
	Age	-0.518	0.196	-0.142	2.637	0.009	-0.906	-0.131
	HAD-A	-1.161	0.431	-0.195	-2.694	0.008	-2.010	-0.311
	HAD-D	-1.543	0.446	-0.245	-3.461	<0.001	-2.423	-0.664
	Male Gender	8.404	3.470	0.157	2.422	0.016	1.560	15.248
	Education							
	Not having formal education	-14.492	4.660	-0.219	-3.110	0.002	-23.684	-5.300
Physical Role Difficulty	Being in the case group	-32.145	4.564	-0.375	-7.043	<0.001	-41.146	-23.143
	HAD-D	-1.509	0.696	-0.149	-2.168	0.031	-2.881	-0.136
	Education	-2.254	0.647	-0.236	-3.485	<0.001	-3.529	-0.978
	Not having formal education	-32.609	6.678	-0.307	-4.883	<0.001	-45.781	-19.438
	Primary school	-13.626	5.017	-0.155	-2.716	0.007	-23.520	-3.732
Pain	Male gender	16.088	6.163	0.184	2.611	0.010	3.934	28.242
	Income level							
	Income <404TL/month	35.702	13.703	0.186	2.606	0.010	8.679	62.726
General health	Being in the case group	-12.260	2.853	-0.253	-4.297	<0.001	-17.888	-6.633
	HAD-A	-1.126	0.404	-0.208	-2.785	0.006	-1.923	-0.328
	HAD-D	-1.864	0.435	-0.326	-4.284	<0.001	-2.722	-1.006
	Income level							
Energy	HAD-A	-1.041	0.334	-0.195	-3.117	0.002	-1.699	-0.382
	HAD-D	-3.035	0.359	-0.537	-8.464	<0.001	-3.743	-2.328
	Income level							
	Income <404 TL/month	-9.358	3.419	-0.158	-2.737	0.007	-16.100	-2.615
Social function	Being in the case group	-7.744	3.060	-0.142	-2.531	0.012	-13.778	-1.709
	HAD-A	-1.475	0.435	-0.242	-3.393	<0.001	-2.333	-0.618
	HAD-D	-2.789	0.470	-0.432	-5.932	<0.001	-3.716	-1.862
Emotional role difficulty	Being in the case group	-24.380	5.281	-0.285	-4.617	<0.001	-34.795	-13.965
	HAD-A	-2.132	0.701	-0.223	-3.039	0.003	-3.515	-0.748
	HAD-D	-2.806	0.759	-0.278	-3.698	<0.001	-4.302	-1.310
	Income level							
	Income <404 TL/month	-28.378	10.903	-0.151	-2.603	0.010	-49.883	-6.873
Mental Health	Being in the case group	-5.677	1.927	-0.154	-2.946	0.004	-9.478	-1.876
	HAD-A	-1.270	0.274	-0.309	-4.636	<0.001	-1.810	-0.729
	HAD-D	-1.844	0.296	-0.425	-2.946	0.004	-9.478	-1.876

B: Regression Coefficient
Std.(B): Standardized Regression Coefficient B: Regression Coefficient
*Independent variables: Being in the case group, Age, HAD-A, HAD-D, Gender, Education (Not having formal education, Primary school, High School or over), Income level (<404, between 404-807, >807 TL/ month)

Questionnaire-9) in diabetic patients admitted to primary care clinics, depression prevalence was found 51% (23). Different numbers found in these studies are thought to originate from differences of scales used and numbers of the study group.

In our study, mean HAD-A and HAD-D scores of women were found higher than men and control group. Relationship between psychiatric symptoms and gender in diabetic patients was investigated in other studies. Nichols and Brown (24) reported that depression is seen two-fold higher in diabetic women than men. It was reported that mean HAD-A and HAD-D scores are higher in woman diabetic patients, there is a significant correlation between gender, depression and anxiety, and female gender is a risk factor for psychiatric symptoms (13,21,22,25). These results are generally consistent with our findings. This may be related with higher prevalence of anxiety and depressive disorders in women than men.

In our study, disease duration changed between 1

and 30 years in the patient group and mean duration was 11.06±7.20 years. When disease duration and mean HAD-A and HAD-D scores were compared, mean scores tended to increase but this difference was not found significant. When literature about the subjects was reviewed, it was seen that anxiety and depression symptoms increase by increasing disease duration (21,23-25). In a study done in Turkey, it was found that levels of depressive symptoms increased but anxiety levels decreased by longer disease duration (22). It can be said that according to these findings, patients are at risk of anxiety symptoms when diagnosis of diabetes was first made and at risk of depressive symptoms at later stages.

In our study, SF-36 subscale scores were significantly lower at all domains in patient group than control group. In other words, scores which were taken from physical function, physical role difficulty, pain, general health, energy, social function, emotional role difficulty and mental health were found statistically and significantly lower in patient group than control group. It was reported in several studies that quality of life of diabetic patients are negatively affected at all domains but especially in physical health and psychosocial domains which are also consistent with our findings (6,7,12,14,26,27).

When relationship between age and quality of life is examined in our study, age was found to affect especially physical function subscale. There are studies which reported absence of a relationship between age and quality of life or reporting age as a weak predictor (28,29). However, Eljedi et al. (26) reported in their study which compared diabetic and non-diabetic cases in refugee camps in Gazzah strip and investigated the effect of age on quality of life. They found that age had a strong effect on physical health and psychosocial domains in diabetic patients but age did not have any effect on quality of life in non-diabetic patients. In some studies it was reported that advanced age is related with lower quality of life scores especially in physical function and emotional role domains (30,31). Age was significantly correlated with lower scores from 4 of 8 sub-domains of SF–36 in a study done in diabetic Pima natives (32). In a study done in Turkey, different from

our study, negative correlation between age of patient and somatic and social domain scores of quality of life was reported (33). These different results may be due different age ranges of cases in sample groups.

In our study, when relationship between gender and SF-36 scores was examined, scores of women in the patient group taken from all sub-domains of SF-36 were found to be lower than mean scores of men and women from the control group. These findings may be related with social status, social role and expectations of women. Total quality of life scores were reported to be significantly lower in diabetic women than men in studies done in Turkey and this is also consistent with our findings (22,33). It was reported that diabetic men are more adherent to treatment, have a lower diabetic burden, develop less anxiety and depression symptoms, have higher quality of life scores and more advantageous than diabetic women from quality of life point of view (26,31,34). In a study done with a group of Greek diabetic patients, female gender was found to have an evident negative effect on quality of life (30). In the study of Sakamaki et al. (29) which used EQ-5D (Japanese version of quality of life scale), although no significant correlation was found between gender and quality of life in type 2 DM patients, it was emphasized that scale used might be inadequate and this finding might be due to not being used with another scale specific to the disease. However, different from results of our study, there are studies which could not detect a relationship between quality of life and gender in the literature as well (27,28,32,35).

In our study, a negative correlation was found between anxiety and depression levels and all sub-domains of quality of life in both groups. Similarly, it was reported in the literature that depression is well-known predictor of quality of life in diabetic patients and quality of life is lower in diabetic patients with depression than other chronic diseases (28,36-40). However, in a study done in Turkey, no linear correlation was found between depression scores and quality of life scores (33). Presence of psychiatric symptoms in diabetic patients may cause low adherence to treatment and inadequate treatment response; this may facilitate development of complications and decrease in quality

of life.

In our study, among patients who had disease duration of more than 10 years, scores taken from physical role difficulty, general health and social function sub-domains of SF-36 were found statistically and significantly lower. When related research is examined, it was reported that there is negative correlation between disease duration and quality of life and disease duration is one of the most meaningful predictors of quality of life among diabetes-specific factors; this is also consistent with our findings (22,27,30,33,34). Increasing number of complications by increasing duration of illness cause lower quality of life. On the other hand, there are studies which reported that there is no significant correlation between quality of life and duration of diabetes (41).

In conclusion, several psychiatric symptoms were found to accompany clinical presentation in diabetic patients in this study. Treatment of psychiatric symptoms should be considered as an important factor in diabetes control. These psychological symptoms which affect current treatment and disease courses of patients are frequently overlooked by clinicians or sometimes can be misdiagnosed. Our study showed the need of interdisciplinary consultation and liaison. In that respect, bio-psycho-social analysis of cases and meeting the requirement to psychiatric help are important issues. Increasing quality of life of patients, decreasing treatment costs and decreasing amount of wasted time for treatment team and patients can be provided by interdisciplinary collaboration.

This study has some limitations. Cross-sectional nature of the study, selection of patients from a single center and not implementing structured interview which has diagnostic value in psychiatric evaluation of cases make it impossible to generalize our findings. Moreover, when considering long mean disease duration of patients included in the study (11.06+7.20 years) , occurrence of sexual function disorder which is a frequent complication of diabetes and negative impact of this on quality of life can be expected. It may be considered as limitation of this study that the SF-36 does not querry sexual functions and does not assess the quality of life in that regard. For this reason, using a quality of life scale specifically developed for diabetes in further studies may provide healthier results. Despite all these limitations, we believe that our study will enlighten further studies in this field due to having a control group and its results.

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