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Original Article

Quality of life and satisfaction with treatment in subjects with type 2 diabetes: results from primary health care in Turkey

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Abstract: The aim of this study was to assess the quality of life and degree of satisfaction with the treatment of patients with type 2 diabetes mellitus (T2DM) in primary health care in Turkey. A total of 180 adults with type 2 diabetes mellitus from the Family Medicine out-patient clinic were included in the study. Participants were asked to fill out a self-report survey to collect data via two well validated scales, including the Turkish version of the Audit of Diabetes Dependent Quality of Life (ADDQoL) instrument and the Diabetes Treatment Satisfaction Questionnaire (DTSQ). Overall average weighted impact score for the study group was -2.73 ± 2.56. Diabetes mellitus has the largest impact on enjoyment of food (mean ± SD impact rating: -1.63 ± 1.50). The mean score of the DTSQ was 21.02 ± 8.07 (range from better to worse: 36 to 0) for the entire group. Presence of diabetes-related complication was significantly related with lower treatment satisfaction scores (mean ± SD = 23.08 ± 7.32 without complications; mean ± SD = 18.48 ± 8.36 with complications, P = 0.003). Physicians working in primary care should be equipped with more recent knowledge of diabetes treatment in order to tailor more appropriate treatment strategies from current guidelines.

Keywords: Diabetes mellitus, HbA1c, QoL, ADDQoL, DTSQ, treatment satisfaction

Introduction

Diabetes is a chronic disease with considerable impact on health status and quality of life and it is considered an urgent public health issue because it has a pandemic potential [1]. The day-to-day medical management of diabetes for the rapidly increasing number of people diagnosed with the disease is demanding both physically and emotionally and can have an adverse impact on patients' quality of life [2, 3]. Diabetes mellitus currently affects about 285 million adults worldwide, with this figure expected to rise to 439 million adults by 2030 [4]. According to two population-based studies, the prevalence of type II diabetes in Turkey raised to 16.5% from 7.2% within 12 years [5-7].

In cross-sectional researches on type 2 diabetes, self-efficacy [8-10] and diabetes coping [11] were associated with good treatment adherence and good glycemic control, whereas stressful life events [12] and daily environmental stress factors [13] have been shown to be associated with poor metabolic control. Depression has been shown to have a significant association with increased HbA1c [14, 15]. Poorly controlled type 2 diabetes mellitus is associated with increased vascular complication rates and increased cardiovascular risk [16], impaired patient quality of life, less satisfaction with treatment, and greater healthcare expense per patient [17]. Based on studies and epidemiological reports, an HbA1c target of < 7% was recommended for most adults with type 2 diabetes in both Europe and the USA [16, 18]. Despite evidence that supports the benefits of achieving optimal glycaemic control, availability of effective treatments and well-disseminated guidelines [19, 20], many patients are not currently treated to these recommended HbA1c targets (< 7%). The prevalence of type 2 diabetes related chronic complications remains high and the long-term sequelae have a negative impact on patients' health. It is known that people who

Table 1. Various socio-demographic and disease-related characteristics of the study group

Characteristics	Diabetic patients (n = 180), %
Gender	
Female	48.3
Male	51.7
Age, years (mean ± SD)	54.79 ± 11.52
< 50	36.1
50-59	32.2
60-69	18.9
≥ 70	12.8
Marital status	
Single	2.2
Married	88.3
Widowed/Divorced	9.5
Occupation	
Housewife	21.1
Worker	41.1
Retired	25.0
Other	12.8
Monthly income, USD	
< 500	30.5
500-1000	42.8
> 1000	26.7
Perceived economic status	
Poor	12.2
Moderate	82.2
Good	5.6
Diabetes control	
HbA1c ≤ 7.5	26.1
HbA1c >7.5	73.9
Duration of diabetes, years (mean ± SD)	7.59 ± 7.02
Comorbidity	
Hypertension	53.3
Heart diseases	24.4
Other chronic disease	15.0

have diabetes with complications tend to report a greater negative impact of their diabetes on their quality of life, as measured by the Audit of Diabetes-Dependent Quality of Life (ADDQoL) questionnaire, than do people who do not have complications [21, 22]. Many clinical trials have investigated treatment satisfaction or diabetes-specific quality of life associated with particular treatment regimens [23]; however, to the best of our knowledge there is no data available evaluating patients' diabetes-related quality of life together with their treatment satisfaction from Turkey.

The aim of this study was to assess quality of life and degree of satisfaction with the treatment of patients with type 2 diabetes mellitus in primary health care in Turkey.

Material and methods

Subjects

A cross-sectional study was conducted between January and April 2014 by using a structured questionnaire. Patients from the family medicine outpatient clinic at the Bezmialem Vakif University Hospital were recruited. The inclusion criteria were as follows: physician diagnosed type 2 diabetes and age between 18 and 65 years old. Patients who were diagnosed as suffering from type 1 diabetes, secondary diabetes, or gestational diabetes were excluded. All patients were diagnosed by physicians in light of diagnostic criteria recommended by the World Health Organization in 1999 [24].

A total of 180 patients with type 2 diabetes mellitus were enrolled in the research after exclusion of incomplete questionnaires. After informed consent was obtained, all participants were given the questionnaire. Where assistance was needed in completing the questionnaire, this was given by patient's physician who were trained in the use of the ADDQoL questionnaire prior to the launch of this study.

Participants were asked to fill out a self-report survey to collect data on a range of psychosocial issues and included a number of previously validated measures, including the ADDQoL. The ADDQoL includes two overview items; one assesses 'present' global quality of life (range +3 to -3) and the second assesses the 'impact of diabetes on' quality of life (range -3 to 1). For both items, lower scores reflect poorer quality of life. Respondents also rate the impact of diabetes (negative to positive, range -3 to +1) on each of 15 specific domains and rate the importance (range 3 to 0) of each domain for their quality of life. The impact score is multiplied by the importance rating to yield a weighted impact score for each domain (range -9 to +3). An average weighted impact (AWI) score is also calculated for the entire scale by averaging across all applicable domains (range -9 to +3).

WHO-Diabetes Treatment Satisfaction Questionnaire DTSQ [25] is an eight-item question-

Table 2. Descriptive statistics of audit of diabetes dependent quality of life

Domain	Unweighted impact scores		Importance scores		Impact scores weighted by importance	
	Mean ± SD	Range	Mean ± SD	Range	Mean ± SD	Range
Employment/career	-1.04 ± 1.08	-3-1	1.72 ± 1.04	0-3	-2.46 ± 3.01	-9-2
Social life	-1.02 ± 1.25	-3-4	1.79 ± 0.97	0-3	-2.45 ± 3.12	-9-4
Family relationships	-1.12 ± 1.35	-3-4	1.99 ± 0.92	0-3	-3.10 ± 3.28	-9-2
Friends	-0.88 ± 1.30	-3-4	1.78 ± 0.98	0-3	-2.29 ± 2.96	-9-3
Sex life	-1.07 ± 1.24	-4-4	1.81 ± 0.99	0-3	-2.58 ± 3.12	-9-6
Sport/leisure	-1.00 ± 1.18	-3-4	1.63 ± 1.06	0-3	-2.54 ± 3.21	-9-1
Travel	-1.05 ± 1.28	-3-4	1.52 ± 1.06	0-3	-2.43 ± 3.28	-9-2
Future of her/himself	-0.66 ± 1.65	-3-4	1.92 ± 0.97	0-3	-1.65 ± 4.20	-9-9
Future of family	-0.88 ± 1.75	-3-4	1.99 ± 0.90	0-3	-2.29 ± 4.36	-9-9
Motivation	-1.39 ± 1.21	-3-2	1.93 ± 0.93	0-3	-3.39 ± 3.40	-9-4
Physical activities	-1.57 ± 1.15	-3-3	2.19 ± 0.78	0-3	-3.88 ± 3.36	-9-6
Others fussing	-0.97 ± 1.25	-3-4	1.67 ± 1.02	0-3	-2.19 ± 3.07	-9-6
Enjoyment of food	-1.63 ± 1.50	-3-3	2.26 ± 0.79	0-3	-4.34 ± 4.02	-9-9

Table 3. Average weighted impact scores by socio-economic and disease-related characteristics of diabetic participants (t-test)

	Average weighted impact scores		Domains with significance
	Mean ± SD	P	
Overall	-2.73 ± 2.56	-	-
Gender		0.695	None
Female	-2.92 ± 2.74		
Male	-2.68 ± 2.52		
Age, years		0.472	None
≤ 50	-2.96 ± 2.87		
> 50	-2.58 ± 2.34		
Marital status		0.340	None
Married	-2.64 ± 2.52		
Other	-3.40 ± 2.92		
Monthly income, USD		0.323	Sex life
< 1000	-2.90 ± 2.63		
≥ 1000	-2.31 ± 2.42		
Diabetes control		0.049	Employment/carrier; family relationships; friends; physical activities; enjoyment of food
HbA1c ≤ 7.5	-1.97 ± 2.09		
HbA1c > 7.5	-3.00 ± 2.67		
Diabetes duration, years		0.925	None
< 10	-2.72 ± 2.71		
≥ 10	-2.77 ± 2.25		
Any complication		0.036	Friends; travel; motivation; physical activities; others fussing
Yes	-3.37 ± 2.65		
No	-2.29 ± 2.41		
Comorbid disease(s)		0.560	None
Yes	-2.57 ± 2.58		
No	-2.87 ± 2.56		
Insulin usage		0.181	Sex life; physical activities
Yes	-3.22 ± 2.43		
No	-2.49 ± 2.61		

Table 4. Relationship between treatment satisfaction and some patient characteristics

Patient characteristics	DTSQ score (Mean ± SD)	p
Overall (range from better to worse: 36 to 0)	21.02 ± 8.07	-
Gender		0.420
Female	22.21 ± 7.13	
Male	20.66 ± 8.34	
Diabetes control		0.546
HbA1c ≤ 7.5	21.31 ± 7.37	
HbA1c > 7.5	20.19 ± 9.92	
Insulin usage		0.650
Yes	20.76 ± 8.17	
No	21.54 ± 7.97	
Marital status		
Married	21.32 ± 8.15	0.302
Other	18.75 ± 7.35	
Age, years		0.368
≤ 50	20.12 ± 8.65	
> 50	21.61 ± 7.68	
Diabetes duration, years		0.205
≤ 10	20.47 ± 8.05	
> 10	22.95 ± 8.02	
Complication		0.003
Yes	18.48 ± 8.36	
No	23.08 ± 7.32	
Comorbidity		0.207
Yes	20.05 ± 8.43	
No	22.10 ± 7.59	

naire, scored on a scale of 0-6, with the aim of assessing total diabetes treatment satisfaction and the perceived frequency of hyperglycemia and hypoglycemia (5-6 = very dissatisfied; 3-4 = dissatisfied; 1-2 = fairly satisfied; 0 = very satisfied); it is completed by the patient. This tool has been identified by the World Health Organization and the International Diabetes Foundation as useful in assessing outcomes of diabetes care [26].

Statistical analysis

The sample data were expressed as frequencies and percentages for categorical variables or by mean values and standard deviation for continuous variables. After the verification of the normal distribution of the variables, *t*-test was performed to describe differences between means of the groups. A linear regression analysis (Pearson's) was performed to verify the association among continuous variables. Data were analyzed using the Statistical Package for the Social Sciences version 16.0 (SPSS, Chicago, IL, USA). A *p* value of less than 0.05 was considered statistically significant.

Results

The duration since the diagnosis was 7.59 ± 7.02 years for participants. At the time of this study, nearly one third of the participants (32.8%) were receiving insulin treatment. Complications to diabetes were reported by 43.9% of participants, most of which were cardio-vascular complications (52.8%) followed by retinopathy (26.7%), neuropathy (12.2%) and nephropathy (8.3%).

Comorbid diseases were reported by 53.0% of the participants and the most commonly reported disease was hypertension (53.3%) followed by heart diseases (24.4%). Various characteristics of the study group is shown in **Table 1**.

The distribution of responses regarding ADD-QoL items and the weights assigned to impact rating is shown in **Table 2**.

Diabetes mellitus has the largest impact on enjoyment of food (mean ± SD impact rating: -1.63 ± 1.50) and the least impact on the item related to future of her/himself (mean ± SD impact rating: -0.66 ± 1.65). Enjoyment of food and physical activities were rated as the most important items (mean ± SD importance rating: 2.26 ± 0.79 and 2.19 ± 0.78, respectively) and travel (1.52 ± 1.06) as the least important item. Enjoyment of food remained as the most affected quality of life item, however the least affected one is changed to the item related to future of her/himself when the weighting was taken into account.

The comparison of the average weighted impact scores of diabetic participants by sex, age, marital status, income, diabetes therapy type, duration of diabetes, presence of diabetic complications and comorbid diseases is shown in **Table 3**. The presence of complication and diabetes control in terms of level of HbA1c had a significant impact on life quality among the diabetic patients.

The mean score of the DTSQ was 21.02 ± 8.07 (range from better to worse: 36 to 0) for the

entire group. We found no association between greater treatment satisfaction and gender despite females reported higher scores (22.21 ± 7.13 in females and 20.66 ± 8.34 in males) No correlation was found between age and treatment satisfaction (Pearson correlation = 0.33, p = 0.744) (**Table 4**).

Presence of diabetes-related complication was significantly related with lower treatment satisfaction scores (mean ± SD = 23.08 ± 7.32 without complications, mean ± SD = 18.48 ± 8.36 with complications, P = 0.003). **Table 4** shows that having any diabetes-related complications was associated with lower satisfaction with treatment.

There was no statistically significant association between presence of comorbidities and treatment satisfaction, although mean DTSQ scores of patients with comorbidities were lower than patients with comorbidity (22.10 ± 7.59, 20.05 ± 8.43, respectively, P = 0.207).

We found no relation between treatment satisfaction and level of HbA1c. DTSQ scores were higher in patients with HbA1c values lower than 7.5%, compared to those with HbA1c values above 7.5%, but the difference was not statistically significant (mean ± SD = 21.31 ± 7.37, mean = 20.19 ± 9.92, respectively, P = 0.546).

Discussion

To the best of our knowledge, this study in Turkey was the first study conducted in primary care to assess the impact of diabetes on patient quality of life and satisfaction with anti-diabetic treatment using international questionnaires validated into Turkish. It is well indicated in patients with type 2 diabetes mellitus, intensive blood glucose control with insulin or oral anti-diabetic therapy substantially decreases progression of microvascular disease and may also reduce the risk of cardio-vascular problems [27, 28]. Therefore, current guidelines recommend the early addition of a second anti-diabetic drug if the patient is poorly controlled on a monotherapy regimen [30]. Blood glucose control data from the PANORAMA study in Spain suggested improved control in patients with type 2 diabetes mellitus seen in primary care. Thus, while in 1996 only 43% of patients had HbA1c values less than 7%, the proportion of well-controlled patients in more recent studies ranged from 59% to 66.4% [17]. The results of this study show that almost 25% of Spanish patients on monotherapy have HbA1c values ≥ 7%. Another study conducted among diabetics showed that patients on monotherapy remained with poor control for a median of two years (range, 0.0-29.7) before a second anti-diabetic drug was added [30]. Both studies suggest that measures are needed to avoid treatment inertia in order to improve the degree of control of patients. The results of this study show that almost only one in fourth (26.1%) of Turkish patients with diabetes on anti-diabetic therapy have HbA1c values < 7.5% in primary care. The results of the current study are worse than the previous studies as seen. This might be originated from diffidence of primary care physicians from intensive oral anti-diabetic therapy or inadequacy in knowledge about current guidelines. The fear of hypoglycaemia in particular can create a barrier to optimal glycaemic control in patients with type 2 diabetes mellitus [31, 32]. In DTSQ, more than half of the study participants (53.4%) stated they had sense of hypoglycaemia in recent days moderate to frequently. Therefore, this situation might be another cause of poorly controlled diabetes among the study group. Although QoL will undoubtedly be damaged by complications of diabetes, it has also been shown to be more negatively impacted in patients on insulin regimens than in those treated by diet and/or tablets alone [33-35]. Average weighted impact scores of the ADDQoL found in the present study were higher both in patients with complications (P=0.036) and in those on insulin treatment. These findings were consistent with previous studies mentioned.

The use of the ADDQoL among diabetic patients has generally shown an almost universally negative impact of diabetes on all domains [21, 36]. The largest negative impact observed in the present study was on enjoyment of food, as seen in **Table 1**, which is in line with previous studies [21, 36]. When the average weighted impact score is taken into consideration, socio-demographic characteristics such as gender, age, marital status, income, were not found to be significantly associated with quality of life, although these characteristics had a significant impact on some of the quality of life domains. For example, female respondents reported a better sex life than males; younger respondents' (≤ 50 years of age) perception about future life was better than that of older respondents; divorced, widowed and single respondents showed worse quality of life than that of

those who were married in all domains. It was reported in a number of studies that quality of life is better among diabetic men than among diabetic women, among people who are younger, among married people [3, 37]. However, in our study none of these socio-demographic factors were found to be significantly different.

However, disease-related characteristics such as presence or absence of complications (P= 0.036) and diabetes control expressed as level of HbA1c (P=0.049) was found to be statistically significantly associated with quality of life in the present study.

Another important observation in our study was that presence of complications were significantly associated with domains concerning friends, travel, motivation, physical activity and others fussing (P < 0.05). These findings were consistent with a previous study indicating the absence of complications were significantly associated with a better quality of life and variance in impact of diabetes on quality of life was explained by late complications [38].

Although, findings in the study were showed insulin treatment reduced the quality of life especially for the following domains as sex life and physical activities, surprisingly, it were found no association between insulin treatment and as well as duration of diabetes with quality of life in the present study. These findings are contrary to the results of a number of previous studies [21, 36, 39]. However, results similar to ours also have been obtained in the literature [38].

According to DTSQ scores, it was found that treatment satisfaction is lower among diabetic patients who have a diabetic complication (P= 0.003). Our finding is consisted with previous studies [40]. No association between co-morbidities and satisfaction was found, despite the high prevalence of comorbidities. A possible explanation for this status is that the most common comorbid disease was hypertension which might be defined as a reticent disease. Treatment satisfaction was found to be associated with lower HbA1c values [41, 42]. No such association was found in this study, although higher DTSQ scores were found in patients with HbA1c values lower than 7.5%. This might be related to the small number of patients enrolled in the study.

One of the strengths of our study is two well validated scales, ADDQoL and DTSQ, were used in the study. Despite several important findings in the present study, relatively small sample size is considered as a limitation of it.

Diabetes mellitus is a metabolic disorder with a high prevalence across the world. The inadequate treatment of the disease, thus chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of different organs, concluding in complications related to the disease. Therefore, this chronic disease affects the quality of life negatively in various fields. Patients who have diabetes complications should be treated as a delicate group among diabetic patients. Those patients require more careful attention in their medical treatment in order to improve their treatment satisfaction and, expectantly, achieve better clinical outcomes. Physicians working in primary care should be equipped with more recent knowledge of diabetes treatment in order to tailor more appropriate treatment strategies from current guidelines. Future research to confirm our results should be designed using larger study samples.

Disclosure of conflict of interest

None.

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