

Quality of life and clinical parameters among Turkish patients with diabetes mellitus

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Background: Diabetes mellitus (DM) may have profound effects on physical and emotional health and quality of life (QoL). Objective: The purpose of this study was to assess the QoL of patients with DM and to determine the clinical parameters and socio-demographic factors that affect the QoL of these patients.

Methods: This is a descriptive study of 212 patients with DM attending the Ege University hospital, Izmir. Ferrans and powers QoL index diabetes version and a socio-demographic questionnaire was administered to assess QoL.

Results: The majority of patients (57.5%) age groups were 45–51 and age mean was 44.34 ± 3.21 . Most of the patients (63.7%) were female, 79.2% were married, 67.0% had complications. The mean HbA1c level was $7.89 \pm 0.95\%$, fasting blood-glucose level was 117.25 ± 5.15 mg/dl, post-prandial blood-glucose level was 155.51 ± 5.39 mg/dl, Body mass index level was 36.40 ± 3.12 kg/m². There was a positive relationship between the scores of QoL, subgroups and all demographic and clinical variables ($p < 0.05$).

Conclusions: Lower income, lower education, low-rated employment and physical complications adversely affect the QoL of patients DM. Such factors need to be addressed by caregivers and nurses managing these patients.

Key words: Diabetes, Quality of life, Clinical parameters

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Introduction

Diabetes mellitus (DM) is one of the most common chronic diseases managed in primary care. Diabetes currently affects 246 million people worldwide and it is expected to affect 438 million by 2025. Currently, the prevalence of diabetes is increasing in Europe and in Turkey, and is predicted to increase substantially in the future.^{1,2} By 2025, the largest increases in diabetes prevalence will take place in developing countries.^{3–5} Each year a further 7 million people develop diabetes. Diabetes leads to significant morbidity and mortality, which can be reduced by effective treatment and preventive measures. Diabetes is the fourth leading cause of global death by disease.^{6,7}

According to TURDEP II study (2010) (Türkiye Diyabet Epidemiyoloji Arastırma Projesi—Diabetes Epidemiology Research Project in Turkey) the prevalence of diabetes in Turkish adults has been estimated as 13.7% and is predicted to rise rapidly. According to TEKHARF (2009) (Turk Eriskinlerinde Kalp Hastalığı ve Risk Faktorleri—Coronary Heart Disease and Coronary Risk Mapping in Turkish Adults) study, the rate of increase of diabetes in our country is 6.7% which means a doubling of diabetes in the population.⁸ According to the National Burden of Disease study of mortality, diabetes is among the ten leading diseases causing deaths in Turkey and ranks eighth with 2.2% at the national level. In terms of gender differences, diabetes is the 11th cause of deaths in men and 7th in women.⁹ Diabetes

2020 Vision and Goals Project' was launched to determine the vision of Diabetes in Turkey. Diabetes 2020: Vision and Goals' project by 2020 includes the identification of the objectives of Turkey's vision for the diabetes and the necessary strategies to achieve these objectives.¹⁰

DM and QoL

In terms of global definitions, QoL consists of satisfaction with life, a personal feeling of well-being or happiness. QoL can be defined as the subjective experience of a person concerning his or her own life.^{11,12} Health-related quality of life (HRQoL), refers to the ways in which health, illness and medical treatment influence an individual's perception of functioning and well-being. QoL is an important health outcome in its own right, representing the ultimate goal of all health interventions.¹³

People with diabetes have a worse QoL than people with no chronic illness, but a better QoL than people with most other serious chronic diseases. The duration and type of diabetes are consistently associated with QoL. DM Type 2 permanently causes several changes in a person's life.¹⁴ A patient's self-care, consisting of daily insulin injections and self-monitoring of blood glucose, acute and long-term complications have an impact on HRQoL.^{15,16}

Since diabetes is a lifelong condition, people with diabetes have significant unfavourable effects on HRQoL.¹⁷ QoL has been shown to be associated with long-term

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outcomes, disease progression and response to therapy in Type 2 diabetes. Furthermore, studies evaluating outcome measures in Type 2 diabetes have focussed on the importance of self-care behaviours.¹⁸

There are a few studies which examined the QoL of Turkish patients with DM. Measurement of QoL as an indicator of health outcome has become increasingly important for patients with DM, where the goal of the treatment is not only to improve prognosis, but also to relieve symptoms and to improve function.⁸ Decreasing risk factors and improving QoL are of great importance for patients with DM.

Therefore, the purpose of this study is to measure HRQOL and to assess the factors associated with HRQOL in a sample of Turkish DM patients

Methods

Sample

There were 300 patients who were willing to cooperate who were treated at the inpatient clinics in Ege University Hospital, in Turkey between October 1, 2009 and March 30, 2010. Eighty-eight of the patients who did not want to participate in the study, who were not able to cooperate with the nurse well enough due to hearing loss when asked to fill in the questionnaire, who had insufficient intellectual capacity to answer the questions and who were diagnosed with any other serious chronic illness were excluded from the study. So this descriptive study has been conducted on 212 patients. Those who were literate, able to communicate verbally, diagnosed with DM by report at least six months before the study were included in the study.

Data collection

The patients fulfilling eligibility criteria were informed orally and with a written form regarding confidentiality and study procedure. Written informed consent forms were collected from those volunteering to participate in the study.

The questionnaires used in the study included the Socio-demographic Characteristics Questionnaire and QoL questionnaire which the researchers prepared after scanning the literature. The investigator collected data through face-to-face interviews during the data collection period.

Socio-demographic characteristics questionnaire Socio-demographic Characteristics Questionnaire is composed of three sections. The first section includes gender, age, marital status, occupation, education, monthly income situation, height and weight. The second section includes physical activity, medical history, the duration of DM and the history of family illnesses. The third section includes DM-related risk factors such as history of Fasting Blood Glucose (FBG), Post-prandial Blood Glucose (PPBG), HbA1c, and Body Mass Index (BMI).

QoL questionnaire This scale was developed by Ferrans CE and Powers MJ, was translated into Turkish by Ozer S and Efe E. Alphas ranged from 0.70 to 0.93 for the health and functioning subgroup, from 0.73 to 0.89 for the social and economic subgroup and from 0.80 to 0.93 for the psychological and spiritual subgroup, for the family subgroup alphas were found 0.78 to 0.85.^{20,21}

The QLI-D tool has 66 items in two parts (satisfaction and importance scale), each of which consists of 33 similar items. The items cover four subgroups: 'health and functioning' (14 items), 'social and economic' (7), 'psychological and spiritual' (7) and 'family' (5). The rating scales for the QLI satisfaction and the QLI Importance questionnaire have six points: very dissatisfied/unimportant, moderately dissatisfied/unimportant, slightly dissatisfied/unimportant, slightly satisfied/important, moderately satisfied/important and very satisfied/important. QoL scores are calculated by weighting every 'satisfied' answer with the corresponding 'important' answer. For the total (overall) QoL score, 33 items from each part were used to calculate the total score. To determine the scores, each satisfaction item is weighted by its corresponding importance item. Hence, the values are combined, i.e., highest scores represent high satisfaction and high importance, and the lowest scores represent low satisfaction and low importance. This scoring scheme is based on the belief that people highly satisfied with areas of life they consider important have a better QoL than those who are unsatisfied with areas they consider important.¹⁹⁻²²

Data analysis

We used the Statistical Package for Social Science 16.0 software (SPSS Institute Inc., Chicago, IL, USA) for statistical analysis of the data. Descriptive statistics for continuous variables were expressed as means and standard deviations (SD). Categorical variables were described as frequencies with percentages for the total sample. One-way ANOVA test was used in comparing quantitative data, in addition Tukey HSD test was used for determining the group causing the difference. Student's *t* test was used for comparing two groups. The results were evaluated with a confidence interval of 95%, and statistical significance was set at $p < 0.05$.

Ethical principles of the research

The approval for the study was obtained from the ethics committee of Ege University School of Nursing. The office of the head physician of the Ege University Hospital granted permission to use the data of the patients presenting at the internal medicine clinic and patients' verbal approvals were obtained. Permission to use the QoL index was granted by the developer.

Results

Description of the sample

Table 1 presents the basic characteristics of the participants, including 212 patients, 57.5% of the patients aged between 45 and 51 years and the mean age was 44.34 ± 3.21 . Of the patients 63.7% were female, 79.2% were married, 44.3% were high school graduates, 60.8% had moderate income, 42.9% were officials.

Of the patients, 65.1% had had diabetes for 6–10 years, 70.9% were close relative, 54.2% used regular oral hypoglycaemic drugs, 71.3% had been using insulin for 4–6 years, 57.5% had received insulin education, 90.6% self-administered insulin, 53.8% administered insulin with a pen, 58.0% had attended specific diabetes education (Table 1). Twenty-five per cent of the participants attended training one day and thirty-three per cent of the participants attended training two days.

Clinical parameters

It was found that the mean FBG level was 117.25 ± 5.15 mg/dl, the mean PPBG level was 155.51 ± 5.39 mg/dl, the mean value of BMI was 36.40 ± 3.12 kg/m² and the mean value of HbA1c was $7.89\% \pm 0.95$ (Table 2).

Table 1 Socio-demographic characteristics of patients with DM.

Socio-demographic characteristics questionnaire	N	%
Sex		
Male	77	36.3
Female	135	63.7
Age groups		
39–44	90	42.5
45–51	122	57.5
Marital status		
Single	168	79.2
Married	44	20.8
Educational status		
Primary school	47	22.2
Secondary school	19	9.0
High school	94	44.3
University	52	24.5
Economic situation		
Medium	129	60.8
Bad	83	39.2
Diabetes years		
1–5 years	40	18.8
6–10 years	138	65.1
11–15 years	34	16.1
Method of insulin administration		
Insulin injection	114	53.8
Insulin pen	98	46.2
Duration of using insulin		
1–3 years	61	28.7
4–6 years	151	71.3
Using oral antidiabetic		
I use regularly	115	54.2
I sometimes forget	97	45.8
Complications		
Yes	142	67.0
No	70	33.0
Specify diabetes education		
Yes	122	58
No	90	42
Total	212	100

Table 2 Fasting, PPBG, Hba1C and BMI means of patients with DM.

Socio-demographic characteristics questionnaire: clinical parameters	Minimum	Maximum	Mean	SD
FBG	110.00	125.00	117.25	5.15
PPBG	150.00	165.00	155.51	5.39
HbA _{1c}	6.00	10.00	7.89	0.95
BMI	30.70	40.18	36.40	3.12

QoL scale and subgroups means

Figure 1 shows the mean scores for the QoL scale and subgroups. The mean scores for QoL subgroups were as follows: 9.46 ± 0.60 for health and functional, 10.86 ± 0.27 for psychological and spiritual, 11.77 ± 0.41 for social and economic status and 13.23 ± 0.22 for family status. The mean score for total QoL was 12.75 ± 0.33 .

Effect to QoL of clinical parameter means

Table 3 shows the effects clinical parameters on QoL. There was a significant relationship between the mean values of HbA1C, BMI, FBG, PPBG and QoL scale and subgroups.

Effects of socio-demographic characteristics on the total scores of QoL and on the mean scores of the subgroups of QoL scores

Comparison of the scores for QoL and QoL all subgroups with respect to age group, education, gender, marital status, insulin use and duration of diabetes, insulin-administration way, self-administration of insulin, duration of insulin use and complications status revealed significant differences. While a significant difference was observed between 'the mean scores for the health and functional and psychological and spiritual subgroups of quality of life' and 'social and economic status and having a relative with DM' ($p < 0.05$), no significant difference was observed regarding the mean scores of the family status ($p > 0.05$).

While there was a significant difference between the insulin-administration way and the mean scores for the health and functional, psychological and spiritual and family subgroups of QoL ($p < 0.05$), there was no significant difference regarding social and economic status ($p > 0.05$).

Although there was a significant relationship between educational programme and health and functional status, family status, social and economic status subgroups ($p < 0.05$), there was no statistically significant difference between participating in training programme and psychological and spiritual status subgroups ($p > 0.05$) (Table 4)

Discussion

Description of the sample

The majority of the patients in our study was middle-aged adults (45–51 years), female, married and high school

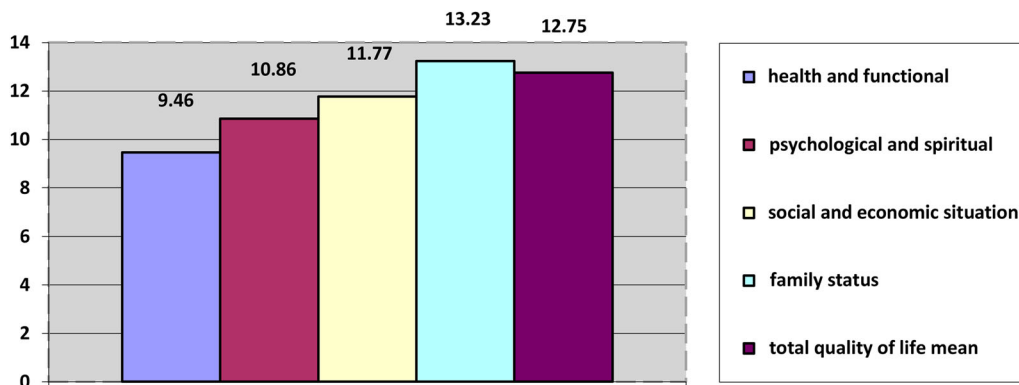


Figure 1. Mean scores of QoL scale and subgroups.

graduates, and had moderate income. Similar results were obtained in five different studies conducted in China, European and Middle East countries in which variables such as the patients' age, gender, education level, marital status and economic situation were considered.²³⁻²⁵ In this study, it was found that most of the patients had received diabetes education, had had diabetes for 6-10 years and developed complications. These results conform with the findings of the study carried out by Holmanova *et al.* (2010).²⁵ However, Wee *et al.* (2005) found that majority of the patients did not participate in diabetes education.²⁶ Ucan *et al.* (2010) found that 85% of patients with diabetes administered insulin themselves, 52.5% of them had used insulin pen for 4-6 years and 64.4% of them had participated in diabetes education.²⁷ In several studies performed with patients with Type 2 diabetes, it was found that the education given to patients had impact on patient's lives.²⁸⁻³¹ In this research, the patients who received diabetes education and QoL scores were found to be higher than average. To get the diabetes education significantly affects the QoL. This research finding supports literatures.²⁸⁻³²

We found that that diabetic retinopathy developed in 36% of the patients, neuropathy in 30% of the patients and nephropathy in 4% of the patients. The results of our research are consistent with the results of research in Middle East countries: Taggart *et al.* (2008) found that diabetic retinopathy developed in 30% of the patients, neuropathy in 24% of the patients and nephropathy in 2% of the patients.³² Tang *et al.* (2008) found that in patients with diabetes developed mostly retinopathy.³³ Ozer *et al.* (2006) determined that of the patients, 50% developed hypertension, 38% developed diabetic foot and 12% developed retinopathy.¹⁹ Eren *et al.* (2004) stated that diabetic complications and diabetic foot developed in 48.1% of the patients.³⁴

Clinical parameters

We found that the mean FBG level was 117.25 ± 5.15 mg/dl, the mean PPBG level was 155.51 ± 5.39 mg/dl, the mean value of BMI was 36.40 ± 3.12 kg/m² and the mean value of HbA1c was 7.89% ± 0.95. Gulseren *et al.* (2001) determined that the mean value of HbA1c was 8.5% ± 1 and the mean value of the patients' BMI

Table 3 Distribution of BMI, fasting, PPBG, HbA1c means impact on QoL.

	Diabetes QoL scale									
	Health and functional		Social and economic situation		Psychological and spiritual status		Family status		QoL total score	
Socio-demographic characteristics questionnaire: clinical parameters	-X	SD	-X	SD	-X	SD	-X	SD	-X	SD
HbA _{1c}	13.67	0.98	15.89	0.25	14.08	0.27	13.2	0.22	14.65	0.73
t	689.78		589.89		389, 57		890.03		459.43	
p	0.01*		0.02*		0.00*		0.03*		0.02*	
BMI	12.97	0.71	13.92	0.63	11.83	0.43	14.90	0.36	14.87	0.55
t	104.42		728.93		520.41		278.94		169.76	
p	0.01*		0.02*		0.01*		0.00*		0.01*	
FBG	14.03	0.27	13.08	0.37	12.04	0.27	15.24	0.67	11.45	0.24
t	589.09		498.03		689.76		399.90		465.54	
p	0.00*		0.01*		0.02*		0.01*		0.02*	
PPBG	11.46	0.60	14.67	0.41	14.08	0.46	16.22	0.22	14.68	0.33
t	203.46		497.42		340.89		577.29		488.67	
p	0.00*		0.01*		0.02*		0.01*		0.01*	

*p<0.05

Table 4 QoL scale and mean values for total QoL scores with respect to socio-demographic characteristics.

Socio-demographic characteristics questionnaire: socio-demographic variables	Diabetes QoL scale												
	N	%	Health-functional		Social-economic		Psychological-spiritual		Family		Total		
			X	SD	X	SD	X	SD	X	SD	X	SD	
Age group	39-44	90	42.4	5.64	0.7	4.9	0.75	7.21	0.34	4.85	0.26	6.36	0.48
	45-51	122	57.5	4.50	0.61	3.23	0.54	5.90	0.52	3.95	0.33	5.99	0.29
	t			7.6		5.8		7.09		6.96		5.79	
	p			0.01*		0.00*		0.02*		0.00*		0.01*	
Education status	Primary school	47	22.2	11.09	0.16	14.25	0.19	14.12	0.12	16.05	0.26	14.39	0.14
	Secondary school	19	9.0	10.94	0.10	14.20	0.18	14.20	0.13	16.05	0.39	14.35	0.19
	High school	94	44.3	11.28	0.47	14.70	0.32	14.21	0.29	16.25	0.27	14.65	0.24
	university	52	24.5	12.32	0.17	15.16	0.28	13.76	0.12	16.41	0.31	15.13	0.13
	F			162.13		172.98		58.05		39.02		189.44	
	p			0.00*		0.00*		0.00*		0.00*		0.00*	
Sex	Male	77	36.3	11.03	0.18	14.21	0.17	14.16	0.07	16.05	0.21	14.37	0.12
	Female	135	63.7	11.71	0.63	14.93	0.26	14.04	0.33	16.33	0.28	14.87	0.28
	t			9.30		23.28		3.14		10.82		15.44	
	p			0.02*		0.01*		0.00*		0.00*		0.00*	
Economic situation	Moderate	129	60.8	12.15	0.11	15.08	0.26	14.26	0.17	16.11	0.16	15.06	0.11
	Poor	83	39.2	11.02	0.32	14.40	0.17	13.81	0.15	16.40	0.19	14.44	0.14
	t			35.91		20.50		18.82		11.59		35.01	
	p			0.00*		0.00*		0.12		0.31		0.02*	
Duration of diabetes	1-5 Years	40	18.8	16.98	0.23	15.90	0.59	16.97	0.39	15.46	0.03	14.98	0.48
	6-10 Years	138	65.1	12.67	0.42	11.84	0.38	14.37	0.35	13.78	0.12	13.57	0.38
	11-15years	34	16.1	11.57	0.34	10.21	0.45	11.59	0.21	10.34	0.26	11.54	0.27
	F			12.97		16.90		14.78		9.89		10.58	
	p			0.01*		0.00*		0.00*		0.02*		0.02*	
Insulin-administration way	Injector	114	53.8	11.00	0.10	14.37	0.26	13.88	0.16	16.06	0.09	14.41	0.08
	Pen	98	46.2	12.00	0.48	15.01	0.24	14.25	0.24	16.42	0.18	15.00	0.20
	t			21.29		18.26		13.41		18.27		27.67	
	p			0.00*		0.07		0.00*		0.00*		0.01*	
State of insulin-administration oneself	Yes	192	90.6	11.38	0.56	14.62	0.39	14.12	0.25	16.21	0.23	14.64	0.31
	No	20	10.4	12.30	0.01	15.15	0.06	13.65	0.06	16.35	0.01	15.11	0.03
	t			7.31		6.04		8.32		8.32		6.58	
	p			0.00*		0.01*		0.00*		0.02*		0.01*	
The duration of using insulin	1-3 years	61	28.7	11.62	0.18	14.86	0.17	14.17	0.07	16.05	0.30	14.86	0.28
	4-6 years	151	71.3	11.04	0.62	14.20	0.32	14.04	0.31	16.30	0.33	12.02	0.30
	t			7.76		15.49		3.02		8.44		11.60	
	p			0.00*		0.01*		0.02*		0.01*		0.00*	
Complication state	Yes	115	54.2	11.07	0.29	14.44	0.28	13.78	0.19	16.15	0.20	14.47	0.15
	No	97	45.8	12.27	0.32	15.13	0.12	14.23	0.15	16.36	0.19	15.11	0.29
	t			17.08		16.04		33.45		7.57		28.66	
	p			0.03*		0.00*		0.01*		0.02*		0.00*	

*p<0.05

was $35.5 \pm 2.7 \text{ kg/m}^2$.³⁵ The results of our research are consistent with the results of research in European countries. Berrardis *et al.* (2004) found that the mean value of HbA1c was $6.41\% \pm 2.29$.³⁶ Thommasen *et al.* (2005) found the mean value of BMI was $36.77 \pm 20.4 \text{ kg/m}^2$.³⁷ Another study screened about 25 000 people found that 36% of the women and 21.5% of the men had a BMI greater than.³⁰ Huang *et al.* (2007) found the mean FBG level was $129.86 \pm 3.15 \text{ mg/dl}$, the mean PPBG level was $150.19 \pm 3.54 \text{ mg/dl}$.¹³

The mean scores for the QoL scale and subgroups

The mean scores for QoL subgroups were as follows: 9.46 ± 0.60 for health and functional, 10.86 ± 0.27 for

psychological and spiritual, 11.77 ± 0.41 for social and economic status and 13.23 ± 0.22 for family status. The mean score for total QoL was 12.75 ± 0.33 (Figure 1). The results of our research are consistent with the results of research in international studies: Trento *et al.* (2004) and Thommasen *et al.* (2005) found lower average scores for the health and functional and psychological subgroups of QoL than for the other subgroups.^{37,38} Shiu *et al.* (2008) found that the mean overall QoL score was at the medium level.³⁹ Ozer and Efe (2006) stated that the mean scores for the overall QoL, health and functional subgroup, social and economic status, psychological and spiritual status and family status were 15.02 ± 9.32 , 15.07 ± 1.37 , $15.22 \pm$

1.67, 15.09 ± 1.41 and 15.24 ± 1.60 respectively.¹⁹ Huang *et al.* (2007) and Berrardis *et al.* (2004) found lower average scores for the social and economic and psychological subgroups of QoL than for the other subgroups.^{13,36}

The relationship between socio-demographic characteristics and the total scores of QoL and the mean scores of the subgroups of QoL scores

There was a significant relationship between the mean values of HbA1C, BMI, FBG, PPBG and QoL scale and subgroups in our study. The results of our research are consistent with the results of research in international studies: Napgal *et al.* (2006) found a significant relationship between FBG level and QoL.⁴⁰ Luscombe (2000) determined that individuals with high fasting and post-prandial blood sugar level had lower QoL in terms of health and functional subgroup.⁴¹ Hill *et al.* (2002) detected that those with high HbA1C values had low overall QoL.⁴² Gulseren (2001) found that those with high fasting and PPBG had lower mean scores for health and functional, psychological and spiritual and family status.³⁵ Holmanova *et al.* (2008) and Tang *et al.* (2008) found significant relationship between FBG, PPBG, BMI, HbA1c variables and QoL.^{25,33}

In the present study, patients who were in 39–44 age groups, university graduates, female, married, civil servant, who had had diabetes for 1–5 years, who had moderate income, who had second-degree relative with diabetes, who attended diabetes education and who used insulin pen had impact on QoL. Patients who administered insulin themselves and developed complications had lower QoL. The results of our research are consistent with the results of research in international studies. Many studies reported that occupation, gender, age, marital and economic status, educational background had an impact on QoL.^{13–17} On the other hand, a few studies show that socio-demographical characteristics did not have an impact on QoL.^{18,22,43} Asadi *et al.* (2004) noted that women who were in 35–45 age groups and patients who did not have complications had higher QoL.⁴³ Thommasen *et al.* (2005) and Taggart *et al.* (2008) found that those who administer insulin themselves had lower QoL.^{32,37} Uden *et al.* (2008) determined that those who participated in training programmes related to diabetes had higher mean scores for health and functional and psychological and spiritual aspects of QoL.²³ Huang *et al.*, 2007 and Shiu *et al.* (2008) found those who had higher education, whose economic condition was good and who had second-degree relatives with diabetes had higher QoL.^{13,39} Ozer and Efe (2006) established statistically significant correlation between gender and psychological and spiritual status, family status subgroups and between education and health and functional status, psychological and spiritual status, family status.¹⁹ Kolawole *et al.* (2009) stated that the way insulin is administered and self-administration of insulin affected the mean scores for the social and economic subgroup of

QoL negatively.²⁴ Davis *et al.* (2001) detected that those who used insulin for a long-time had lower QoL in terms of health and functional, psychological, economic and family status.⁴⁴ Huang *et al.* (2007), Kamarul *et al.* (2010) stated that those who used insulin for a long time had lower QoL in terms of functional and economic status and those who used insulin pen had higher mean scores for the social and economic subgroup of QoL.^{13,45}

Study limitations

The study data were obtained only in one hospital in Turkey. Therefore, the results may not represent all patients with DM Type 2 in Turkey.

Conclusion

DM affects patients' overall QoL. In this study, it was found that the QoL in patients with diabetes was 12.75 ± 0.33 . Some clinical and socio-demographic characteristics affect patients' QoL.

Risk-factor modification and organization of training programmes with ensured participation of patients and their relatives are of critical importance in improving their QoL. Therefore, nurses should be aware of their role to provide appropriate education to patients with DM with the focus on reducing and controlling effective factors on DM and increasing their QoL. Health care providers, including nurses, are key members of the QoL for patients with DM. Thus, they play a central role in providing appraisal, informational and physical, emotional and social support. Nurses can assess the sources of support and qualities of those relationships when they first meet patients during counselling and help patients/families determine effective strategies in receiving positive, enduring support.

Practice implication

QoL depends on the core domains for physical, psychological, social and economical function, which reiterates the importance of proving comprehensive, holistic nursing care. For this reason, nurses need to develop QoL concepts and reflect in patient's care practices. Nurses dealing with patients with DM should constantly incorporate their knowledge about the changes in patients' risk factors and QoL requirements into their clinic and nursing plans. In the future, further longitudinal or experimental designs that investigate DM risk factors and their association with QoL can be conducted in larger sample groups with the coordination of different disciplines.

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