

Evaluation of Life Quality Functions in Patients with Type 2 Diabetes Mellitus

Tip 2 Diabetes Mellitus'lu Hastaların Yaşam Kalitesi Fonksiyonlarının Değerlendirilmesi

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Abstract

Objective: In this study, we aimed to investigate the effect of glycemic regulation, duration of diabetes and antidiabetic treatment on the quality of life (QOL) and to detect other factors that may affect QOL in type 2 diabetic patients using the short form-36 quality of life scale (SF-36).

Materials and Methods: One hundred patients diagnosed with type 2 diabetes (according to the American Diabetes Association criteria) upon admission to the Endocrinology clinic of Adana Numune Training and Research Hospital between 1 July 2007 and 31 October 2007 were included in the study. One hundred healthy age- and gender-matched cases were also included as a control group. QOL assessments were made using the SF-36, and blood and urine samples were also collected.

Results: In this study, we found several factors that affect QOL parameters. We detected a specific impairment in QOL among diabetic patients compared to healthy control subjects. The presence of more complications, neuropathy, retinopathy, low education level, lack of diabetes education, insulin treatment, inadequate metabolic control, long duration of disease, concomitant chronic disease and being a woman were all additional factors found to negatively affect the QOL.

Conclusions: While our results mostly support the current literature, we believe that physiologic, demographic, and behaviour/attitude characteristics should be evaluated together with diabetic complications. Therefore, along with achieving metabolic control, attempts to identify risky patients are gaining importance as a way to improve the QOL of patients with type 2 diabetes. *Turk Jem 2008; 12: 68-72*

Key words: Type 2 diabetes, SF-36 quality of life scale

Özet

Amaç: Çalışmamızda tip 2 diyabetik hastalarında glisemi regülasyonu, diyabet süresi ve antidiyabetik tedavinin yaşam kalitesine etkisi ve yaşam kalitesini etkileyen diğer faktörleri kısa form-36 (Short Form-36, SF-36) yaşam kalitesi ölçeğini kullanarak araştırmayı amaçladık.

Gereç ve Yöntemler: Çalışmaya 2007 yılında 1 Temmuz-31 Ekim tarihleri arasında Adana Numune Eğitim ve Araştırma Hastanesi Endokrinoloji Polikliniğine başvuran, ADA(Amerikan Diyabet Derneği) kriterlerine göre tip 2 DM tanısı konulmuş 100 hasta alınmıştır.

Bulgular: Çalışmamızda yaşam kalitesi fonksiyonlarını etkileyen çeşitli parametreler bulduk. Çalışmamızda kontrol grubunun olması nedeniyle DM'de yaşam kalitesi yönünden özgül bir bozulma olduğunu söylemekle birlikte; komplikasyonların, nöropati ve retinopati olmasının, komplikasyon sayısının fazla olmasının, eğitim durumunun düşük olmasının, diyabet eğitimi almamış olmanın, insülin kullanımının, yeterli metabolik kontrolün sağlanamayışının, hastalık süresinin uzun olmasının, eşlik eden kronik hastalıkların ve kadın olmanın yaşam kalitesini olumsuz yönde etkilediği söylenebilir.

Sonuç: Sonuçlarımız literatürleri desteklerken hastaların fizyolojik, demografik, davranışla ve tutumla ilgili karakteristik özellikleri ve diyabetik komplikasyonların birlikte değerlendirilmesi gerektiğini düşünüyoruz. Bu bağlamda, hastalığın metabolik kontrolünün sağlanması yanında hastaların yaşam kalitelerinin düzeltilmesi için risk grubu olarak kabul edilebilecek hastalara yönelik girişimler önem kazanmaktadır. Böylece diyabetik hasta için optimal sağaltım ve bakım koşulları gerçekleşmiş olacaktır. *Turk Jem 2008; 12: 68-72*

Anahtar kelimeler: Tip 2 diyabet, SF-36 yaşam kalitesi ölçeği

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Introduction

Due to the use of insulin and oral anti-diabetics (OAD), the life span of patients with type 2 diabetes has markedly increased. As a result, the frequency of chronic complications in these patients has increased as well. Those complications are the primary causes of morbidity and mortality in diabetic patients (1).

Today, patient education is the most important step in the management of diabetes. One-on-one education aims to identify the individual features of the patient in order to enhance treatment adherence. Based on various investigations that were carried out to establish the level of knowledge of diabetic patients about their treatment, it has been determined that most did not have enough information about their disease (2).

According to the World Health Organization's (WHO) definition, health is a state of complete physical, mental and social well being, and not merely the absence of disease or infirmity. The emphasis on being in a state of complete physical, mental and social well-being is directly related with the quality of life (QOL). QOL has been defined as providing individuals' basic demands and social expectations and their utilization of facilities introduced by the community. In other words, it is the way of understanding and appreciating ones personal situation that arises from his/her aims, expectations, interests and life standards under their cultural or intellectual conditions (3).

QOL has been used to predict the effect of different diseases on functioning and well-being, to compare the results of different treatment modalities (such as medical or surgical), and to determine the differences between two treatments in terms of mortality and/or morbidity (4,5).

Currently, the most commonly used scale for measuring QOL is the Short-form 36 (SF-36) health survey (6,7). SF-36 has a generic QOL scale that maintains versatile measurement, and was developed and introduced by the Rand Corporation in 1992 (7). Using a self-evaluating scale, the SF-36 measures eight QOL parameters, which include the following: physical functioning, role limitations due to physical health, bodily pain, general health perceptions, vitality, social functioning, role limitations due to emotional problems, and mental health. Measuring physical function and related skills is the most distinctive advantage of the scale, while the absence of a question that evaluates sexual functioning is one limitation (8).

SF-36, both alone and in combination with other scales, is used frequently (9-12). The validity and reliability of SF-36 has been shown in both type 1 and type 2 diabetes mellitus (13,14). Additionally, SF-36 has also been used for comparing the effects of other diseases on the QOL (15-17).

In this study, we aimed to investigate the effect of glycemic regulation, duration of diabetes and antidiabetic treatment on the QOL, and to detect other factors that may affect QOL in type 2 diabetic patients admitted to the Endocrinology clinic of Adana Numune Training and Research Hospital, using the SF-36 QOL scale.

Material and Methods

Patient Population

One hundred patients diagnosed with type 2 diabetes (according to the American Diabetes Association criteria) upon admission to

the Endocrinology clinic of Adana Numune Training and Research Hospital between 1 July 2007 and 31 October 2007 were included in the study as the patient group. As a control group, 100 cases without any known diseases, and matched for age, gender, and socio-demographic characteristics, were also included. Exclusion criteria for this study included the diagnosis of type 1 diabetes, and the presence or history of any chronic diseases such as past myocardial infarction (MI), congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), chronic kidney disease (CKD) or liver disease.

The aim of this study was explained to all participants, and they were asked whether or not they would answer the questionnaire. The informed consent for all enrolled patients and case controls included in this study were taken.

Study Design

Data were obtained by questionnaires completed during face-to-face patient interviews. The SF-36 QOL scale was provided to all patients and controls, and measurements were assessed by a Microsoft Excel program.

Blood sampling was performed to determine the lipid profile, to test liver function, and to measure urea-creatinine levels, and fasting blood glucose and HbA1c levels (both of which are markers of glycemic control). Urine samples were also obtained to detect microalbuminuria.

Retinopathy diagnosis was made by fundoscopic examination. Nephropathy diagnosis was based on microalbuminuria, urea and creatinine levels, where the presence of two positive microalbuminuria results among last three tests was accepted to be significant. A neurofilament test was conducted for the neuropathy diagnosis.

Statistical analysis

SPSS (Statistical Package for Social Sciences) for Windows 11.0 program was used for statistical analysis, and data were analyzed by descriptive methods while parametric data were compared by Student *t* tests. Nonparametric data were compared by Chi-square tests. Correlation analysis of parametric and nonparametric data was done by Pearson and Spearman correlation tests, respectively. Results were assessed for 95% confidence intervals and *p* values lower than 0.05 were accepted to be statistically significant.

Results

In comparing the patient group and the control group, there were no significant differences in the gender distribution ($p=0.232$), mean ages ($p=0.578$), or education levels ($p=0.214$). However, in patients with type 2 diabetes, the scores for QOL parameters of physical functioning, role limitations-physical, bodily pain, general health, vitality, and role limitations-emotional, were significantly lower than those of the healthy controls ($p<0.05$ for each).

In the patient group, correlations between QOL scores and demographic characteristics were assessed. It was observed that the QOL scores increased significantly with the increase in education level ($p<0.05$). We also detected a negative and statistically significant correlation between age and physical functioning ($r=-0.338$, $p=0.001$), however no significant correlations between age and other QOL parameters were detected ($p>0.5$). Furthermore, no significant correlation was found

between body mass index (BMI) and QOL parameters ($p>0.05$). All of the scores for the eight QOL parameters in female patients were statistically significantly lower than those of the male patients ($p<0.05$ for each).

Correlations between blood glucose levels and QOL scores were also examined in the patient group. It was found that the increase in blood glucose levels negatively correlated with QOL scores. Specifically, negative significant correlations were detected between fasting blood glucose and physical functioning, role limitations-physical, general health, vitality, social functioning and mental health ($p<0.05$ for each), while there was no significant correlation between fasting blood glucose and bodily pain and role limitations-emotional ($p>0.05$ for each).

In the patient group, the diabetes duration ranged from 3 months to 23 years, and the mean diabetes duration was 8.3 ± 5.5 years. When the correlation between diabetes duration and QOL scores were investigated, a significant negative correlation was found between physical function and diabetes duration ($p=0.014$). There was no such significant correlation for role limitations-physical, bodily pain, general health, vitality, role limitations-emotional and mental health scores ($p>0.05$).

In the patient group, no statistically significant difference was found between the control frequencies of males and females ($p=0.315$).

QOL scores were also examined in the context of HbA1c levels. When the QOL scores of cases with HbA1c levels of $\leq 7\%$ and $7-10\%$ were compared, we detected no statistically significant difference ($p>0.05$). We also detected a nonsignificant difference in the physical functioning, bodily pain, general health, vitality, and social functioning scores of the cases with HbA1c levels of $\leq 7\%$ and ones with levels $\geq 10\%$ ($p>0.05$). On the other hand, we found a significant difference in role limitations-physical and role limitations-emotional scores between the two groups ($p=0.016$ and $p=0.019$, respectively). When the QOL scores of cases with HbA1c levels of $7-10\%$ and $\geq 10\%$ were compared, we detected a significant difference among role limitations-physical ($p=0.034$), bodily pain ($p=0.037$), vitality ($p=0.043$) and role limitations-emotional ($p=0.033$). However, there was no such significant difference among other QOL parameter scores in these two groups ($p>0.05$).

QOL assessments were also compared in the diabetic patients, divided into sub-groups based on whether they received diabetes education or complied with nutritional recommendations. When the QOL parameters of patients with diabetes education ($n=53$) and without diabetes education ($n=47$) were compared, it was found that diabetes education resulted in a significant improvement in bodily pain scores only ($p=0.047$), while no significant differences were found among other QOL parameters. There were also no statistically significant differences in the mean QOL scores between patients who had or had not followed the nutritional suggestions given by a dietitian ($p>0.05$).

We detected no statistically significant difference in the mean QOL scores between the patients that were using OAD and ones that were not ($p>0.05$ for each). However, in the patients using insulin compared to the non-insulin users, the mean scores of physical functioning, bodily pain and general health were significantly lower ($p=0.0001$, $p=0.016$ and $p=0.031$, respectively). As the number of the diabetic complications increased, the mean scores of all QOL parameters significantly decreased ($p<0.05$ for each). Specifically, a significant negative correlation

was found between the number of complications and physical functioning, role limitations-physical, bodily pain, general health, vitality, social functioning, role limitations-emotional and mental health scores ($r=-0.484$ $p=0.0001$; $r=-0.359$ $p=0.0001$; $r=-0.408$ $p=0.0001$; $r=-0.480$ $p=0.0001$; $r=-0.396$ $p=0.0001$; $r=-0.330$ $p=0.001$; $r=-0.359$ $p=0.0001$ and $r=-0.304$ $p=0.002$, respectively). There was no statistically significant difference among gender for the number of complications ($p=0.435$).

QOL parameters were also compared in patients with and without neuropathy, retinopathy, and nephropathy. The mean scores of all QOL parameters were significantly lower in patients with neuropathy in comparison to those without neuropathy ($p<0.05$). The mean physical functioning, general health and vitality scores of patients with retinopathy were also significantly lower than that those without retinopathy ($p=0.001$, $p=0.007$ and $p=0.014$, respectively). When the QOL parameters were compared based on the presence of nephropathy (as determined by microalbuminuric level), no significant difference was found in the mean QOL scores ($p>0.05$).

Discussion

The discomfort from the acute and chronic complications of diabetes, diabetic symptoms, dietary limitations, medical treatment and co-morbid diseases may cause disruption in the QOL of diabetic patients (18). It has also been emphasized that improving the QOL is a primary goal of diabetes treatment (19). It has been found that QOL is associated with the hyperglycemia, insulin treatment, duration of diabetes, age, gender, diabetic complications and co-morbid diseases (20). Therefore, diabetic patients should be educated on how to better control their glycemic levels, which in turn may improve life quality (21).

Our study showed that the scores for several QOL parameters (including physical functioning, role limitations-physical, bodily pain, general health, vitality and role limitations-emotional) were significantly lower in diabetic patients than in those of the healthy control group. We did not detect any statistically significant correlation between BMI and life quality functions. While the education levels were comparable between the control and patient groups, the mean QOL scores in the patient group significantly increased with the rise in the education level.

Although there was a significant, but weak, negative correlation between fasting blood glucose and physical functioning, role limitations-physical, general health, vitality and mental health, there was no significant correlation between fasting blood glucose and bodily pain or role limitations-emotional.

Researchers have reported that health-related life quality is better among diabetic males in comparison with female diabetics (22,23). For example, Gönen et al have reported that QOL scores in male diabetics are better than in female diabetics (24). Similarly, in our study, all of the QOL parameters in female patients were lower than in the male patients.

Age is another parameter that may affect the QOL, although there are conflicting reports. For example, Brown et al (25) and Rubin et al (22) from America have reported that age has no affect on QOL parameters. In contrast, Gulliford et al (26) and Redekop et al (27) from Holland, as well as Klein et al (28) and Glasgow et al (29) from America, have reported that advanced age has negative effects on QOL. Gönen et al from Turkey reported

that advanced age negatively correlates only with physical function (24). Consistent with that finding, in our study we also detected a statistically significant negative correlation between age and physical functioning, but nonsignificant correlations for the other QOL parameters.

Many studies have observed decreases in QOL functions as the duration of diabetes increases (24,26-31). Moreover, Gülseren et al reported that as the diabetes duration increases, the scores for physical functioning and bodily pain worsen (20). Similarly, in our study, we also detected a significant negative correlation between physical function and diabetes duration.

Good metabolic control can decrease the microvascular complication of diabetes. HbA1c is one of the most commonly used predictors of metabolic control. Gönen et al detected a significant correlation between HbA1c and physical functioning, bodily pain, general health and mental health using the SF-36 life quality questionnaire (32). Larsson et al also reported that in patients with poor metabolic control, the QOL was worse (33). In our study, we did not detect a significant difference between the QOL parameters in patients with HbA1c levels $\leq 7\%$ and ones with levels of 7-10%. However, when the patients with HbA1c levels of $\leq 7\%$ and ones with levels of $\geq 10\%$ were compared, we did detect a significant difference in role limitations-physical and role limitations-emotional among these two groups. A statistically significant difference was also found in role limitations-physical, bodily pain, vitality and role limitations-emotional scores between the patients with HbA1c levels of 7-10% and ones with levels $\geq 10\%$. In conclusion, HbA1c levels not only represent a good marker for metabolic and glycemic control, but may also be a good QOL predictor, as well.

Studies have shown that the number of diabetic complications can negatively affect physical functioning, role limitations-physical and general health parameters (34). Furthermore, in a study by Gulliford and Mahabir, QOL was negatively affected by the increase in the severity of clinical status (determined by complications and hyper- and hypo-glycemia signs), with the most disturbed QOL parameters being role limitations-physical, role limitations-emotional and general health (26). In our study, we detected a significant negative correlation between the number of complications and all eight of the QOL parameters (including physical functioning, role limitations-physical, bodily pain, general health, vitality, social functioning, role limitations-emotional and mental health). Therefore, the prevention and adequate treatment of complications appears to be an important strategy in improving life quality in diabetic patients. Retrospective and prospective studies have supported the relationship between hyperglycemia and the severity of neuropathy (35). Ahroni and Boyko reported that renal and neuropathic complications were the ones that most affected the QOL, as determined by SF-36 (36). In our study, the mean scores for all QOL parameters were lower among neuropathic patients in comparison to patients without neuropathy. Consequently, measurements and treatments that prevent neuropathy have been associated with positively changing QOL parameters in diabetic patients. The prevalence of nephropathy, the most common cause of end stage renal failure in developed countries, has been continuously increasing in Turkey as well. According to the WHO life quality questionnaire, QOL is negatively affected in diabetic nephro-

pathic patients with microalbuminuria (32). In our study, when we compare QOL scores of patients according to the presence of nephropathy, we saw that there was no statistically significant difference between the values of nephropathic and non-nephropathic patients, and a negative effect of microalbuminuria was not observed. Effective treatment (by improved glycemic control, frequent blood pressure monitoring, and regular follow-ups) and preventive measures for nephropathy have decreased the occurrence of nephropathy while simultaneously improving the QOL for diabetic patients.

Diabetic retinopathy is the most common cause of blindness, especially in developed countries, and it negatively affects the QOL. In a study by Gönen et al, no worsening was detected in the QOL parameters due to retinopathy using SF-36 (32). However, in our study we found that physical functioning, general health and vitality scores were significantly lower in patients with retinopathy compared to those without retinopathy.

In contrast to our expectations, no significant difference was detected between QOL scores in the diabetic patients that followed nutritional suggestions from a dietitian and those that did not. However, we did observe a significant improvement in bodily pain scores in patients who were given diabetes education compared to those that were not.

We did not detect any significant difference between the QOL scores of diabetic patients grouped according to their treatment modality (OAD versus non-OAD users). However, the physical functioning, bodily pain and general health scores of patients using an insulin regimen were found to be significantly lower than those of patients who did not use insulin.

In conclusion, type 2 diabetes is a disease with microvascular and macrovascular complications, and therefore patients must have regular follow-ups beginning just after diagnosis. Along with minimizing complications and increasing lifespan, having a quality life is also important. In our study, several parameters that affect QOL were assessed. Since we had a control group in the study, it was possible to identify specific disturbances in the life quality due to type 2 diabetes. The existence of complications, neuropathy and retinopathy, increased number of complications, low education level, absence of diabetes education, usage of insulin, inadequate metabolic control, long duration of the disease, co-morbid disease presence and female gender all seemed to be specific conditions that negatively affected QOL in diabetic patients. While our results mostly support the current literature, we believe that physiologic, demographic, behavior and attitude characteristics should be evaluated together with diabetic complications. Therefore, along with achieving metabolic control, attempts to identify risky patients are gaining importance in order to improve QOL of diabetic patients.

Abbreviations

DM: Diabetes mellitus

SF-36: Short Form-36

OAD: Oral Anti-diabetic drug

ADA: American Diabetes Association

BMI: body mass index

MI: myocardial infarction

CHF: congestive heart failure

CKD: chronic kidney disease

COPD: chronic obstructive pulmonary disease

SF: social function

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