Turkish Journal of Endocrinology and Metabolism, (2004) 3 : 91-99 **ORIGINAL ARTICLE**

The Determinants of Quality of Life Including Treatment Satisfaction in Patients with Type Two Diabetes Mellitus: Are Different Generic Qol Instruments Sensitive to the Same Determinants?

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The aim of this study was to assess the determinants of health related quality of life of patients with type 2 diabetes, using two generic quality of life instruments: SF-36 and WHOQOL-BREF.

Ninety eight patients with type 2 diabetes, monitored in the CBU Medical Faculty Endocrinology department during the first half of the year of 2001 were included in the study.

The patients completed a questionnaire including socio-demographic variables, disease/treatment history, indicators of glycaemic control (HbA1c, FPG and PPG)and their satisfaction on disease management as well as three generic Qol questionnaires. The domain scores of the Qol instruments were considered as dependent variables.

The mean age of the subjects was 54.2 ± 11.4 years and 71.4 percent of them were female.

HbA1c did not show any relationship with any of the domains of the instruments.

Factors which negatively affected some of the domain scores of SF-36 were: lower levels of education; being female and a younger subject and living with an another diabetic in the family; having a diabetic complication and higher level of post-prandial blood glucose and to be a member of nuclear family. Higher satisfaction from glycaemic control management increased the domain scores of WHOQOL. SF-36 and WHOQOL-BREF gave consistent results in diabetic complications.

It is concluded that, SF-36 is a useful profile in assessing functional status in type 2 diabetes. On the other hand, besides its ability to predict functional status of disease, WHOQOL-BREF can be regarded as a very useful instrument to be used especially in assessing health service satisfaction and health management purposes in clinical settings.

Keywords: Ambulatory Care, Quality of Life, Patient Satisfaction, Who, Outpatients

Introduction

Diabetes is associated with a major burden of physical and psychological disability, and these are likely to substantially impair the quality of life (Qol) of the patients. Besides acute and chronic complications, Qol in diabetic patients appears to be related to demographic, medical-historical, and self-management factors. Self-perceived Qol is an important concept in assessing the level of metabolic control and health services given to the diabetic patients.

Previous research indicated that, the level of socio-demographic status (e.g. less education, lower income, marital dissatisfaction)(1-3); cognitive representation of illness (e.g., understanding, consequences, cause, time-line, controllability), diabetes-specific health behaviors like diet and exercise (2, 4) and depression and anxiety (5-8), as well as glycaemic control (9-18) effect the perceived quality of life in diabetes patients. Four major potential impacts on the Qol of diabetic patients were extracted as physical aspects, well-being and satisfaction, diabetes-

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specific stress, and treatment satisfaction and no single questionnaire covered all relevant aspects of the QoL of subjects with type 2 diabetes (19). The association of health related quality of life (HRQOL) and, treatment quality (e.g. continuity of care) or clinical outcomes (e.g HbA1c) should be ditsinguished from the relationship of HRQOL and treatment satisfaction which is a subjective evaluation. On the other hand, neither well-being nor treatment satisfaction correlated with HbA1c (20) and the positive relationship between HRQOL and good continuity of care does not guarantee an association between HRQOL and satisfaction with care in diabetics (21). Similarly some research indicates that adherence to treatment rules do not always improve quality of life (2, 9- 12)

Both generic and disease specific measures are used in the appraisal of quality of life in diabetic population. It is recommended to use routinely disease specific and generic measures in clinical practice (22,23). Since all diseases and disabilities affect the overall quality of life , there is a requirement for generic measures which capture this It was pointed out that, "assessment of disease-specific treatment and outcomes may indicate relatively little about the individual's overall health well-being". And generic measures would also avoid the risk of focusing too specifically on clinical correlates of disease." (24,25)

According to a recent review, there are five diabetes specific Qol instruments with a good evidence of reliability and validity (26). The main focus is on the generic profiles, so disease specific instruments is out of concern for this study. There are a number of generic questionnaires that have been used in people with diverse chronic conditions including diabetes mellitus. There have been some findings on the comparison of the specific strengths and weaknesses of generic instruments with respect to biomedical and psychological but very few findings on satisfaction with treatment on patients with diabetes mellitus. SF-36 is a generic tool which span functional health status and general health and it has been most widely used on diabetic patients and WHOQOL is relatively newly developed scale with a sound theoretical structure both are validated for Turkish. WHOQOL yielded some preliminary results that indicate its sensitivity to change in the health service satisfaction (27) While many of the studies which used SF-36 pointed out the usefulness of the scale on assessing Qol of the patients with diabetes (17, 28- 30), Woodcock stated that Sf-36 scores are strongly affected by non-diabetic comorbidity in type 2 (31) . So at this point selectiong an appropriate generic Qol measure is crucial.

We hypothesised in this study that : while SF-36 is more responsive to the changes of functional health status, WHOQOL measures the impact of satisfaction from disease. and treatment management upon quality of life. It has to be stated here that the main concern of this study is to set out a rationale for selecting appropriate generic profiles to be used in different purposes on diabetic population (eg. measuring the effect of patient satisfaction or clinical outcomes of therapy on qol)

Materials and Methods

Two Generic Qol instruments used in this study are: The Short Form of the Medical Outcome Study (SF36), and Short form of the World Health Organization Quality of Life Questionnaire (WHOQOL-BREF). The domain scores of the two generic instruments are the dependent variables of this study.

The Medical Outcomes Study 36-item Health Survey (SF-36)

SF-36 includes 36 items and assesses eight domains of functional status: physical functioning, role functioning-physical, role functioning-emotional, bodily pain, general health, vitality, mental health and social functioning (32). Some researchers use two general domain scores also: general physical and general mental domain scores. The instrument has good cross validations with other generic Qol measures. It has been validated for Turkish in 1999 (33).

World Health Organization Quality of Life Questionnaire abbreviated version (WHOQOL-BREF)

WHOQOL-BREF is the abbreviated version of the original WHOQOL instrument. While the long form includes 100 items, WHOQOL-BREF is a 26 item -with five point Likert type response scales-generic Qol instrument. It was developed by WHO as a multilingual, multidimensional profile of Qol for cross-cultural use (34, 35). WHOQOL was adapted to more than 40 cultures in the world. WHOQOL-BFEF has four broad domains namely: Physical, Psychological, Social Relations and

Environmental domains. The instrument assesses satisfaction with life as well as the impact of disease or illness, and it captures positive and negative aspects of Qol. It was validated for Turkish by Eser et al. (36).

Subjects

Ninety eight patients with type two diabetes of the 115 diabetics attending to the outpatient department of Celal Bayar University Medical Faculty Endocrinology department during the period of December 1st –June 30th 2001 were recruited for the study. Besides the necessity to be able to read the questionnaire and provide informed consent, subjects were included if they were >18 years of age, diagnosed as suffering from type 2 diabetes mellitus for at least one year and if they had no psychiatric disorder. Eleven newly diagnosed -less than one year of disease onset –type 2 diabetes patients, five type 1 diabetes patients and patient with a psychiatric disorder were not eligible for the study and they were excluded. All of the patients are under health insurance coverage. Health insurance coverage is about 70 % in Turkey and all f the people who own health insurance except blue collar workers and their families are accepted to the University hospital. So the diabetics can be considered to be members of middle-high social class in the community.

The patients completed the questionnaire including their socio-demographic variables, disease/treatment history, current biomedical indicators of metabolic control, subjective evaluations of the control of their disease and three Qol instruments in a silent room near the out-patient department. A researcher was present to offer assistance while the patient completed the questionnaires.

The disease status, complications of diabetes, co-morbid conditions and metabolic control indictors were double checked either with patient information obtained from the questionnaire or patient computer data of that person present in the out-patient department. The glycaemic control were determined by measuring glycated hemoglobin level (HbA1c), fasting plasma glucose (FPG) and post-prandial blood glucose (PPG) on the same day as the questionnaires were completed. HbA1c levels provide an indication of the average blood glucose concentration during the preceding 2-3 months, incorporating both pre- and post-prandial glycemia and it is the most accepted indicator of long-term glycaemic control. While FPG is the traditional way for assessing glycaemic control, PPG plays an important role in the pathogenesis of diabetic complications and should be a specific target of therapy (37).

Statistical Methods

Student's t test and Spearman Correlation were used in the univariate analysis. When the criteria were not eligible to perform two groups comparison, Mann Whitney U test were used. The multiple linear regression models were performed in order to control the effects of the possible confounders on the dependent variables explained. Only the variables that significantly explain the dependent variables in the univariate analysis were included to the multiple regression models. The Backward Wald last models' standardized Beta values were presented in the tables. Two tailed p value of 0.05 was taken to indicate statistical significance both in the univariate and multivariate analysis. All tests were carried out using SPSS 10.0 statistical package.

Results

The mean age of the subjects was 54.2 ± 11.4 years (min: 23, max:81) and 71.4 percent of them were female. About 43 percent of the patients' level of education were at least five years, the rest of them were educated for at least eight years. Of the subjects, 88.7 % were currently married; 17.3% were currently smoking. Most of the subjects (85.7 %) were the members of a nuclear type family (table 1). 41.9 % of the subjects were overweight, with body mass index (BMI) 25.0 to 29.9, and 43.0 % were obese with BMI 30 and over. The mean duration of diabetes was 7.17± 6.92 years. 22.5 % of the subjects were managed with diet only while 58.1 % treated with oral anti-diabetics (OAD), 12.2 % with insulin and 9.2 % combined OAD with insulin. The 28.6 % of patients experienced diabetic complications excluding hypertension and 54.1 % including hypertension. Fourteen percent experienced at least one hypo-glycaemic episode in the preceding weeks; 15.3 % were diagnosed as having diabetic retinopathy; 14.3 % had neuropathy; 9.2 % have ever experienced a diabetic food problem; one patient has end stage renal disease and about seven percent experienced myocardial infarction. 60.2 % of the subjects have co-morbid conditions associated with diabetes. 64.3 %.of patients lived in a family with another diabetic person (table 1). Among the subjects, 78.1 % were self-monitoring their blood glucose levels by a

portable glucometer at home while the remaining were monitored in a health care facility.

39.8 % of the patients were not monitored for their metabolic conditions with a mean of 3.3 month since from the last examination. The question: "How would you rate your level of monitoring of your disease " was answered as "good" by 70.4 percent of the patients and 22.4 percent answered to the same question as "poor". While 65.3 % answered to the question: "How would you rate your level of monitoring of your blood glucose "as "good" and 28.6 % answered as "poor". In terms of glycaemic control, 55.1% were good, 14.3% were acceptable and 22.5% were poor, according to the criteria of Diabetes Control and Complications Trial (38) (table 1). On the other hand 40.8 % of the subjects' last Fasting Plasma Glucose (FPG) value was over the cut-off level of 140 mg/dl . 39.8% and 25.5 % of patients were measured to have post-prandial blood glucose (PPG) levels higher than 160 mg/dl and 180 mg/dl respectively.

Table 1. Social, demographic characteristics and disease status of subjects.

n = 98		n (%)
Age (years)		54.2 ± 11.4
Gender	Male	28 (28.6)
	Female	70 (71.4)
Education	Literate only	10 (10.6)
	Five years	40 (42.6)
	Eight years and over	44 (46.8)
Marital status	Married	86 (87.8)
	Widowed	9 (9.2)
	Single	2 (2.0)
Family type	Nuclear	84 (85.7)
	Expanded	14 (14.3)
Economic status	Well	85 (88.5)
	Poor	11 (11.5)
Smoking	Currently smoking	17 (17.3)
	Not smoking	81 (82.7)
Alcohol	Social drinker[a]	92 (94.8)
	Do not drink	5 (5.2)
HbA1c	Good (<7.5%)	54 (55.1)
	Acceptable (7.5 – 8.4%)	14 (14.3)
	Poor (> 8.4%)	25 (22.5)
Rate of Diabetic Complications	Any complication	28 (28.6)
	Retinopathy	15 (15.3)
	Neuropathy	14 (14.3)
	Foot problem	9 (9.2)
	Myocardial infarction	7 (7.1)
	Hypoglycaemic episode	14 (14.3)
Co-morbid condition		59 (60.2)

[a] Drinks only in social events.

In the univariate analysis presented on table 2 and 3, not all independent variables were dicotomus variables e.g. marital status and education. As we look at how the independent variables explain the Qol scales, in general it is clear that the independent variables which are the indicators of glycaemic control such as HbA1c and blood glucose level, explained both physical and psychological domains of SF-36. The better the glycaemic control, the higher the Qol score obtained. In contrary, self evaluations of the patients on their disease and glycaemic control management mostly explain the WHOQOL domains and Qol scores improve when they think that they are managed well. SF-36 physical scales and role emotional scale and WHOQOL-BREF physical and psychological domains explain diabetic complications together in the univariate comparisons. The presence of chronic diabetic complications worsen the level of perceived health related quality of life. Similar results were obtained for the experience of a hypoglycaemic episode during two weeks before the application of scales. Insulin therapy and duration of diabetes shorter than 10 years decreased the physical and general health scale scores of WHOQOL-BREF and SF-36. The existence of an other diabetic person in the family has improved the scores of SF-36 physical and psychological scores of the subjects while the other two Qol instruments were not influenced in anyway. The socio-demographic variables also affected Qol. Especially being female decreased almost all of the scale scores of WHOQOL-BREF and SF-36. Some physical scale scores of SF-36 were decreased in the subjects with low level of education. WHOQOL-BREF physical and especially environmental domain scores improved as the age of the patients increased. Neither of the sub-scales were explained by marital status, perceived economical status, smoking, body mass index and existence of a co-morbid non-diabetic condition in the analysis.

The multivariate analysis, presented on the tables 4 and 5 were performed in order to control the confounding effects of the variables on the dependent variables (domain scores). Only the independent variables that showed statistically significant relationships with the dependent variables were taken in the multiple linear regression analysis. If a dependent variable was explained by only one independent variable it was considered unnecessary to establish a multivariate model for that sub-

Table 2. Univariate analysis [a] for comparison of socio-demographic variables with each of the domains-scales of the two Qol instruments as dependent variables.

	WHOQOL-BREF				SF - 36							
	Physical	Psycho-logical	Social relations	Environment	Physical function.	Role physical	Bodily pain	General health	Vitality	Social functioning	Role emotional	Mental health
Age	ns [b]	ns	ns	0.003 (r=0.29) [c]	0.007 (r=-0.28)	ns	ns	ns	ns	ns	ns	ns
Gender [d]	0.027	0.016	0.054	ns	0.011	0.019	ns	ns	ns	ns	ns	0.047
Education [d]	ns	ns	ns	ns	ns	0.027	ns	0.058	ns	ns	ns	ns
Marital status	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Family type [d]	ns	ns	ns	ns	ns	ns	0.018	ns	ns	ns	ns	ns
Economic status	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Smoking	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
BMI	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns

[a] All of the independent variables except age are dicotom variables and tested by Student's t test. When the assumptions of Student's t test are violated, a non parametric test: Mann Whitney test used for WHOQOL and SF-36 scales.
[b] Non-significant
[c] Spearman correlation
[d] being male, higher education and belonging to a nuclear family improves Qol in the related sub-sclaes.

Table 3. Univariate analysis [a e] for comparison of disease specific variables with each of the domains-scales of the two Qol instruments as dependent variables.

	WHOQOL-BREF							
	Physical	Pschological	Social relations	Environ.	Physical function	Role physical	Bodily pain	General health
HbA1c								
(Cut-off 7.4%)	ns [b]	ns	ns	ns	ns	ns	ns	ns
(Cut-off 8.4%)	ns	ns	ns	ns	ns	ns	ns	ns
FBG [c]								
(Cut-off 140 mg/dl)	ns	ns	ns	ns	ns	ns	0.007	ns
(Cut-off 160 mg/dl)	ns	ns	ns	ns	ns	ns	ns	ns
PBG								
(Cut-off 180 mg/dl)	ns	ns	ns	ns	0.038	0.016	0.012	ns
Duration (Cut-off 10 years)	0.022	ns	ns	ns	ns	ns	ns	0.028
Complication [d]	0.004	0.041	ns	ns	0.003	0.028	0.026	ns
Type of therapy (insulin and others)	0.005	ns	ns	ns	0.044	ns	ns	ns
Co-morbidity	ns	ns	ns	ns	ns	ns	ns	ns
Diabetic in the family	ns	ns	ns	ns	0.040	0.042	ns	ns
Hypoglyc. Episode	0.012	ns	ns	0.060	0.004	0.016	ns	ns
Satisfaction from monitor. blood glucose	0.001	0.018	0.000	0.000	ns	0.035	ns	ns
Satisfaction from disease monitoring	ns	ns	0.001	0.000	ns	ns	0.001	ns

[a] All of the independent variables except age are dicotom variables and tested by Student's t test. When the assumptions of Student's t test are violated, a non parametric test: Mann Whitney test used for WHOQOL and SF-36 scales.
[b] Non-significant [c] FBG: Fasting blood glucose; PPG: Postprandial glucose.
[e] Lower HbA1c level, lower FBG, PBG, higher duration of diabetes**,** presence of any diabetic complication, insulin therapy, ever experience of hypoglycaemic episode *worsen Qol;* whereas, living with a diabetic person in the family, higher satisfaction from monitoring blood glucose and satisfaction from disease monitoring, *improve Qol scores* in the sub-scales which gave significant results.
[d]hypertension excluded
[e] Spearman correlation

scale. Social functioning sub-scale of SF-36 is an example which was explained only by HbA1c. Special attention were paid to avoid multi-coli-nearity in the multivaiate models established.

Table 4. Regression of sociodemographic variables and the variables related with diabetes on WHOQOL-BREF Domain scores.

	Physical domain (R^2=0.30) [c]	Psychological domain (R^2=0.16) [c]	Social relations domain (R^2=0.17) [c]	Environmental domain (R^2=0.23) [c]
Age	ns [b]	ns	-	0.21
Gender	0.21 [a]	0.25	-	-
Self evaluation of monitoring blood glucose	0.31*	0.23	0.41	0.39
Self evaluation of monitoring his/her disease	-	-	ns	ns
Duration of disease	ns	-	-	-
Diabetic complication	-0.28	ns	-	-
Hypoglycaemic episode (previous two weeks)	ns	-	-	ns
Type of therapy	ns	-	-	-

[a] Standardized Beta values of the variables explaining the dependent variable with $p< 0.05$

[b] Non-significant

[c] Percentage of domanin score explained

Table 5. Regression of sociodemographic variables and the variables related with diabetes on the scales [a] of SF-36 .

	Physical functioning (R^2=0.36) [b]	Role-physical (R^2=0.32) [c]	Bodily pain (R^2=0.29) [c]	General health (R^2=0.10) [c]	Role-emotional (R^2=0.09) [c]
Age	-0.27 [c]	ns [d]	ns	ns	ns
Gender	0.25	ns	-	-	ns
Postprandial Blood Glucose	ns	-0.30	ns	ns	-0.29
Education	-	0.21	-	0.22	-
Family type	-	-	-0.19	-	-
Presence of any diabetic complication	-0.32	ns	-0.22	-	-
Presence of a diabetic in the family	ns	0.18	-	-	-
Hypoglycaemic episode	-0.27	ns	-	-	-
Self evaluation of monitoring blood glucose	-	-	-	-	-
Self evaluation of monitoring his/her disease	-	-	-0.39	-	-
Duration of diabetes	-	-	-	0.23	-
Type of the therapy	ns	-	-	-	-

[a] No multivariate analysis were performed explaining vitality, social functioning and mental health scales of SF-36, because in the univariate analysis vitality scale showed no relationship with any of the independent variables while social functioning and mental health scales had relationship with only one variable as shown on the table 2.

[b] Percentage of domanin score explained

[c] Standardized Beta values of the variables explaining the dependent variable with $p< 0.05$

[d] Non-significant

The relationships between "the satisfaction from glycaemic control management" and the domain scores of WHOQOL-BREF existed in all of the models. If the subjects thought that their blood glucose were well monitored then all of the domain scores of WHOQOL-BREF have increased consistently. The disadvantage of being female and having a chronic diabetic complication on Qol score, persisted in the physical domain of WHOQOL-BREF (table 4).

In the multiple regression models for SF-36 domains presented on the table 5, having a diabetic complication (chronic or acute), being female and a younger subject negatively affect physical functioning score. High level of post-prandial blood glucose worsened role functions either physical or emotional. In addition, physical role function domain score improved with higher levels of education and living with an another diabetic in the family. Bodily pain domain were explained by family type, diabetic complication and perceived evaluation of monitoring his/her disease. To be a member of extended family, not to have chronic diabetic complication and to feel his/her disease well monitored improved Qol. And finally general health domain score increased with higher level of education and longer than 10 years of duration of diabetes.

Discussion

The choice of the Qol instrument is an important issue. As Rubin & Peyrot (13) stated that, it is important to use a multidimensional assessment of Qol in diabetes. Diabetes specific and generic Qol instruments have been used in the studies on assessing Qol of diabetic patients. Garratt and colleagues in their review mentioned that, though there are nine diabetes specific Qol instruments, seven of them are multidimensional and only five of them have good evidence for reliability and validity. On the other hand none of the diabetes specific instruments has been formally assessed for responsiveness to changes in health (26).

The socioeconomic level of patients might affect quality of life as well as disease status. Though the health insurance coverage in Turkey is about 65 percent in general population, all of the recruited patients have health insurance. This may be attributed to the high health care costs in university hospitals. Health insurance coverage is an indirect indicator of high socioeconomic status and might affect Qol positively.

Sociodemographic variables have shown some clear effects on quality of life in some domains of WHOQOL-BREF and SF-36: While younger age increased physical function score of SF-36, older age improved the environmental domain score in WHOQOL-BREF. Environmental domain is a kind of socio-demographic composite index which includes physical safety, financial resources, home and physical environmental and health services attributes. The domain could not sufficiently distinguished healthy and sick people in the analysis of cross validation (39). So this is an expected relationship independent of diabetes.

In both of the instruments being female worsened the Qol. This is also an expected result independent from diabetes seen in normal population (40) though gender was found to be only a confounding variable in some other studies (2). Level of education, the type of the family and the existence of an another diabetic person in the family also predicted SF-36 domains while they did not show any relationships with the WHOQOL-BREF domains. The higher Qol scores obtained from the patients who belong to extended families and who live with an another diabetic in the family can be explained with the feeling of solidarity and disease identity (understanding of the disease). Disease identity is one of the five basic components in the Cognitive representations of diabetes suggested by Leventhal and Diefenbach (41)

HbA1c, which is accepted as a gold standard for assessing long term glycaemic control (38), did not show any relationship with both of WHOQOL-BREF or SF-36 domains. WHOQOL-BREF was not tested on glycaemic control yet, whereas the SF-36 and some other instruments did not have predictive validity regarding glycaemic control in most of the studies either (1, 9, 17, 42, 43, 44, 45). But PPG could predict role-physical and role-emotional domains of SF-36. Postprandial hyperglycemia probably has an important role in the pathogenesis of diabetic complications (37). And both high level of PPG and presence of acute (hypoglycemia) or chronic diabetic complications were consistent in predicting physical function domain of SF-36. The relationship of diabetic complications with Qol has been shown obviously in the literature. Complications of diabetes –including hypoglycemia- are the most important disease-specific determinants of quality of life (2, 13, 19, 45, 46). SF-36 and WHOQOL-BREF gave consistent results in diabetic complications also in our study.

One of the most interesting results of this study is that, in the multiple regression models, all of the domains of WHOQOL-BREF were predicted by perceived satisfaction of blood glucose monitoring whereas SF-36 were not in any of the domains. WHOQOL-BREF has given similar results dealing with treatment satisfaction and nursing services satisfaction for a wide variety of diseases in an another study conducted in the same region (27). Hanninen has found in his study that , HRQOL was associated with good continuity of care but no associations were found between the HRQOL dimensions of SF-20 and satisfaction with care in patients with diabetes (21).

These findings clearly differentiate the two generic Qol tools in diabetes management that, while SF-36 is an appropriate tool in assessing the functional status of diabetic patients, WHOQOL-BREF is an instrument that should be used health service satisfaction for management purposes. The predictability of SF-36 to functional status in a variety of diseases is well known from the literature. What is new here is, the responsiveness of WHOQOL to perceived health service satisfaction independent

of clinical outcomes. This is not an unexpected finding for such an instrument which was defined as a profile which has a good underlying theoretical conceptualization of Qol (47).

Conclusion

Age, gender, level of education, family type (nuclear or extended) and the existence of an another diabetic person in the family were the independent predictors of SF-36 domains in the multiple regression models whereas WHOQOL-BREF domains could not be explained with most of them. So, it can be suggested that sociodemographic variables should strictly be controlled in the studies using SF-36 as a tool of Qol assessment.

SF-36 is a useful profile in assessing functional status in type 2 diabetes. It is a very appropriate generic Qol tool to be used in the comparison of the functional consequences of alternative treatments. On the other hand, besides its ability to predict functional status of disease, WHOQOL-BREF can be regarded as a very useful profile to be used especially in assessing health service satisfaction and health management purposes in clinical settings.

The conclusion of this study suggested that, the researchers on the field of diabetes may use either SF-36 or WHOQOL-BREF if they intend to compare the objective outcomes of alternative interventions, whereas WHOQOL-BREF can be regarded as a preferable tool if the researchers want to evaluate the effects of the interventions on the perceived health service satisfaction or if they want to use it for health and program management asessment purposes.

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