Original article

Assessment of health-related quality of life among adult patients with type 2 diabetes mellitus

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Summary

Introduction.The aim of the study was to find out the determinants of the quality of life in primary health care patients with type 2 diabetes.

Methods. The cross-sectional study included 181 patients, aged 37 to 89 years, with diabetes mellitus type 2, registered with four family medicine practices. The assessment of health status was conducted using medical history, objective examination, laboratory analyses, dilated eye exam, screening for distal symmetric neuropathy and ankle-brachial index measurement. In evaluating the impact of diabetes mellitus on patients' health status, a generic instrument, the self-administered WHOQOL-BREF questionnaire, was used. Multivariate linear regression models were used to analyze the variables associated with the quality of life.

Results. Out of 181 adult patients with type 2 diabetes mellitus, 73 (40.3%) had diabetes for less than 5 years. The mean glycated hemoglobin (A1C) was 7.55% and the mean serum levels of fasting glucose, total cholesterol, LDL-cholesterol, HDL-cholesterol and triglycerides were above the recommended values. Most of the patients had comorbidities, chronic diabetes complications and used oral hypoglycemic agents in combination with insulin. The multivariate regression analysis showed that the age, psychological health, nephropathy and environment were associated with the domain of physical health. The determinants of psychological health were age, marital status and environment. Older and single patients had lower scores, whereas those with a better living environment had higher scores in the domain of social relationship. The levels of glycemic control and gender have not been shown to be significant determinants of any of the four domains.

Conclusion. The factors associated with the different domains of quality of life in patients with type 2 diabetes are multiple, but mainly relate to age, living environment and diabetes complications. The results can be used as a guideline for defining measures that can improve the quality of life of patients with type 2 diabetes.

Keywords: type 2 diabetes mellitus, health-related quality of life, socioeconomic factors, WHOQOL-BREF

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Introduction

According to the International Diabetes Federation, 382 million adults worldwide had diabetes in 2013 and 5.1 million died due to the disease [1]. Traditionally, the impact of diabetes has been measured in terms of either morbidity or mortality. However, Health-Related Quality of Life [HRQoL) has been recognized as an important and measurable outcome of healthcare interventions [2,3]. HRQoL is commonly recognized as a multidimensional concept including domains of physical health and functioning, mental health, social functioning, satisfaction with treatment, concerns about the future and general well-being. It is a central issue for patients, providers and policy makers. In patients with diabetes, it may predict an individual's capacity to manage this condition and to maintain long-term health and well-being [4]. Generally, diabetes negatively impacts HRQoL. This negative impact affects different aspects of a person's life, including the psychological impact of being chronically ill, changes in social relationships, dietary restrictions, symptoms of inadequate metabolic control and acute or chronic complications [5-9].

Patients with diabetes often feel challenged by their disease and its day-to-day management demands. Therefore, a patient's perception of his/her own quality of life is considered as a valuable basis for identifying targets for improvement [10-12].

The aim of the study was to investigate the determinants of the quality of life in patients with type 2 diabetes mellitus from Bosnia and Herzegovina, such as duration of the disease, degree of glycemic control, presence of micro and macrovascular complications and demographic characteristics of patients.

Methods

This cross-sectional survey was conducted at the Primary Health Care Center Banja Luka, in the period between October and December 2014. The sample size for the population of 1598 patients with diabetes mellitus included in the regional Diabetes Registry with a confidence interval of 6.99% and a confidence level of 95% was calculated to be 175. A specifically established audit team randomly selected 200 patients with diabetes mellitus from the Diabetes Registry administered by the data bases of four family medicine teams. All patients who were included in the study were invited to visit their family doctor at the scheduled time. Patients with any unstable medical illness, the inability to read and those who chose not to participate in the study were excluded.

During the visit to the family doctor, patients were informed about the aim of the study and their written informed consent was sought and obtained. In the analytical database, personal identifiers were removed to preserve confidentiality, and access to the database was controlled by the Committee for Science and Research of Medical Faculty Banja Luka. The study was conducted with the approval of the Ethical Committee of the Primary Health Care Center (number: 01-791-1).

The measures of the patients' health status were assessed during the visit. The patients were asked to complete two questionnaires. A standardized questionnaire was used to collect current data regarding the patients' characteristics, such as gender, age, place of residence, marital status, education, occupation, duration of diabetes mellitus, therapy used, comorbidities, microvascular and macrovascular complications. Diabetes treatment was obtained from patients medical record and was classified as oral hypoglycemic agent, oral hypoglycemic agent combined with insulin, and insulin alone. The diagnoses of microvascular and macrovascular complications were confirmed by the set of physical examinations, including urine protein analysis, serum creatinine, dilated eye exam, foot examination, screening for distal symmetric neuropathy and ankle-brachial index.

Biochemical analyzes were carried out at the Laboratory for Clinical Biochemistry, Primary Health Care Center of Banja Luka. Blood samples were collected from peripheral veins after 12 hours of fasting. The whole blood was used for the analysis of glycated hemoglobin (A1C), and serum for fasting glu-

cose and lipid profile levels (including total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglycerides). Total cholesterol (mmol/L) was measured using photometric method with cholesterol oxidase, and HDL-cholesterol (mmol/L) using extensively homologous enzymatic method with PEG on biochemical analyzer "KOBAS INTEGRA 400 + ISE" company "Roche". LDL-cholesterol (mmol/L) was determined by an indirect method, whereas triglycerides level (mmol/L) was analyzed using enzymatic colorimetric method with glycerol oxidase. Enzymatic colorimetric method (GOD/PAP) was used to measure serum glucose (mmol/L). A1c% serum level was measured by a turbidimetric immunoinhibition method.

In evaluating the impact of diabetes mellitus on patients, a generic instrument, the self-administered WHOQOL-BREF questionnaire was used. Life domains included in the questionnaire were as follows: physical health with 7 items (daily activities, dependence on medicinal substances and medical aids, energy and fatigue, mobility, pain and discomfort, sleep and rest, work capacity), psychological health with 6 items (bodily image and appearance, negative feelings, positive feelings, self-esteem, spirituality / religion / personal beliefs, thinking, learning, memory and concentration), social relationship with 3 items (personal relationships, social support, sexual activity) and environment with 8 items (financial resources, freedom, physical safety and security, leisure activities, physical environment) [13]. All four domain scores were scaled in a positive direction with higher scores indicating a higher quality of life.

Statistical analyses were carried out using SPSS 17.0 (SPSS Inc., Chicago, IL, USA). Descriptive procedures included frequencies and percentage for categorical variables, and means and standard deviations (SD) for continuous variables. To investigate the differences in HRQoL in relation to the characteristics of patients and the disease, t-independent test, ANOVA and Kruskall-Wallis test were used. Multivariate linear regression analysis was used to identify independent factors for HRQoL. The variables included in the models

were as follows: age, gender, marital status, place of residents, displaced person, family size, number of children, monthly income, education, duration of disease, microvascular and macrovascular complication, hyperlipidemia, glycemic control, environment, social domain, physical and psychological health. For each variable, beta coefficients represent the mean variation of domain score for a given category compared to the reference category. P value<0.05 was considered statistically significant.

Results

The study included 181 adult patients with diabetes mellitus type 2 (response rate was 94%).

Table 1. General demographic and clinical data of patients with diabetes (n = 181).

Variable	Patients
Age, years (mean ± SD)	62.38±9.71
Gender – male, N (%)	108 (58.3)
Marital status , N (%)	
Married	137 (75.7)
Single	6 (3.3)
Divorced	7 (3.9)
Widowed	31 (17.1)
Environment – town dwellers, N (%)	140 (77.3)
Occupation – town dwellers, N (%)	
Blue-collar jobs	13 (18.2)
White-collars jobs	33 (7.2)
Self-employed	6 (3.3)
Unemployed	23 (12.7)
Retiree	105 (58)
Student	1 (0.6)
Duration of disease, years (mean ± SD)	8.76±6.819
glucose serum, mmol/L (mean ± SD)	8.7±2.8
A1C, % (mean ± SD)	7.55±1.38
Cholesterol, mmol/L (mean ± SD)	5.41±1.14
HDL-cholesterol, mmol/L (mean ± SD)	1.39±0.65
LDL-cholesterol, mmol/L (mean ± SD)	3.12±1.05
Triglycerides, mmol/L (mean ± SD)	2.08±1.5
BMI, kg/m² (mean ± SD)	29.43±4.72
Waist circumference, cm (mean ± SD)	101±15.001
Therapy, N (%)	
oral hypoglycemic agents	38 (21)
insulin	24 (13.26)
insulin + oral hypoglycemic agents	119 (65.7)

Table 1 (*Continued*)

Comorbidities, N (%)	
Hypertension	147 (81.2)
Cardiovascular disease	49 (27.1)
Malignancy	8 (4.4)
Chronic liver disease	4 (2.2)
Hyperlipidemia	87 (48.1)
Diabetes complications, N (%)	
Microangiopathy	102 (56.3)
Macroangipathy	60 (33.2)
Average score on domains, mean ± SD	
Physical health	58.66±18.13
Psychological health	60.97±11.99
Social relationship	61.03±17.63
Environment	64.29±12.41

The patients were mainly of male gender, 59.3%. The average age of the patients was 62.38 years, with a range from 37 to 89 years. The majority of the patients were town dwellers. Approximately 40.3% of the patients had diabetes mellitus for less than 5 years. The mean level of A1C was 7.55% and of blood glucose 8.7 mmol/L. The mean values of total cholesterol, LDL-cholesterol, HDL-cholesterol and triglycerides were above the recommended values for patients as follows, cholesterol > 4mmol/L, LDL-cholesterol > 2.6 mmol/L, HDL-cholesterol < 1.0 mmol/L in men, 1.3mmol/L in women and triglycerides

Table 2. Comparison of the WHOQOL-BREF mean scores in four domains according to patients' characteristics, A1C level and diabetes complications

Characteristics	Domains			
	Physical health	Psychological health	Social relationship	Environment
A1C				
< 7%	61.18±14.99	63.71±12.20	63.63±14.69	66.62±11.90
≥7%	60.00±19.60	60.78±12.90	65.02±16.42	63.84±12.56
P value	0.030*	0.282	0.515	0.543
Duration of disease				
< 5 year	62.23±16.97	62.23±11.61	63.80±18.36	64.70±11.90
6-9 year	57.22±18.33	59.49±14.24	60.20±16.93	64.32±14.42
≥ 10 year	57.04±19.54	62.49±12.98	61.10±18.14	63.98±13.80
P value	0.250	0.610	0.561	0.990
Age				
< 65 year	62.43±17.62	63.41±11.20	65.88±17.81	64.83±12.65
≥ 65 year	55.01±18.22	58.82±14.44	56.76±16.56	63.80±13.96
P value	0.005	0.01	0.001	0.459
Place of living				
Rural	58.66±18.55	60.44±15.24	60.68±19.72	59.56±14.33
Urban	59.35±18.17	61.69±12.15	62.26±17.28	65.79±12.57
P value	0.876	0.393	0.971	0.017
Education				
Low	50.83±19.75	62.56±12.41	54.90±17.22	57.38±13.97
Middle	60.62±18.13	62.56±12.41	63.96±17.21	64.89±12.45
High	64.54±13.48	65.59±8.66	64.15±18.48	70.61±10.84
P value	0.002	0.000	0.021	0.000
Peripheral artery disease				
Yes	42.91±19.58	51.96±17.29	50.83±20.17	58.74±14.35
No	61.56±16.79	62.78±11.55	63.51±16.92	65.2±12.87
P value	0.000	0.001	0.007	0.026

Table 2 (*Continued*)

Characteristics	Domains			
	Physical health	Psychological health	Social relationship	Environment
Heart attack				
Yes	54.20±19.14	57.53±15.33	63.00±21.65	65.13±15.30
No	59.64±18.11	61.75±12.63	61.80±17.50	65.13±13.05
P value	0.275	0.475	0.536	0.763
Stroke				
Yes	51.27±20.79	55.73±15.66	54.54±16.48	53.54±14.36
No	59.70±17.98	61.77±12.64	62.37±17.84	65.08±12.86
P value	0.152	0.196	0.162	0.012
Diabetic foot				
Yes	50.27±25.33	61.45±12.40	60.82±19.21	58.64±14.74
No	59.77±17.60	61.40±12.94	61.97± 17.78	64.75±13.06
P value	0.332	0.882	0.763	0.209
Nephropathy				
Yes	41.50±18.51	53.58±13.03	62.00±16.93	57.83±10.70
No	60.44±17.57	61.96±12.72	61.89±17.93	64.84±13.27
P value	0.002	0.027	0.694	0.056
Neuropathy				
Yes	53.30±19.35	59.44±12.91	62.72±15.66	63.63±14.68
No	61.70±17.17	62.24±12.82	61.55±18.71	64.70±12.58
P value	0.017*	0.135	0.714	0.575
Retinopathy				
Yes	54.17±19.14	61.69±16.14	61.30±19.98	62.03±16.73
No	60.44±17.82	61.33±12.00	62.04±17.31	64.96±12.18
P value	0.079	0.871	0.776	0.221

A1c=glycated hemoglobin A1c

> 1.7mmol/L. The mean BMI was 29.43 ± 4.72 kg/m^2 and BMI ≤ 25 kg/m^2 had 19.34% patients. Most of the patients had comorbidities, diabetes complications and used oral hypoglycemic agents in combination with insulin (Table 1).

The age was significantly associated with the quality of life of patients in the domains of physical health (p = 0.005), psychological health and social relations (p < 0.0001), with patients younger than 64 years of age having a better quality of life in these domains compared to the patients older than 65 years. No significant difference in any HRQoL domain was found between patients from different places of residence as well as between those with or without heart attack and diabetic foot. The patients with higher educational level had a significantly better quality of life compared to the patients with a lower level of education (Table 2). Patients who have suffered stroke had a significantly poorer quality of life in the environment domain (p = 0.012), whereas the patients with peripheral vascular disease showed significantly poorer scores in all four domains (Table 2). Patients with nephropathy had a significantly lower quality of life in the area of physical health (p = 0.002) and psycho-

Table 3. Factors associated with quality of life in physical and psychological domain in patients with type 2 diabetes (Multivariate linear regression analysis)

	Domain			
	Physical health		Psychological health	
	B (95% CI)	P-value	B (95% CI)	P-value
Age	-0.06 (-0.12-0.00)	0.048	-0.34 (-0.50-0.03)	0.004
Gender	-0.49 (-1.60-0.62)	0.383	0.26 (-0.52-0.81)	0.344
Marital status	0.34 (-0.18-0.87)	0.203	-0.28 (-0.45-0.18)	0.003
Nephropathy	-2.04 (-4.07--0.01)	0.049	0.21 (-1.52-0.94	0.069
Retinopathy	-0.45 (-1.68-0.78)	0.473	0.09 (-0.20-0.65)	0.765
Neuropathy	-0.85 (-1.98-0.27)	0.135	0.38 (-0.13-0.62)	0.162
Myocardial infarction	-1.38 (-3.10-0.33)	0.113	0.26 (-1.09-0.70)	0.532
Stroke	0.38 (-1.58-2.33)	0.704	-0.02 (-0.92-1.42)	0.968
PAD	-0.87 (-2.46-0.72)	0.281	-0.37 (-1.72-1.17)	0.341
Diabetic foot	-1.33 (-3.42-0.76)	0.210	0.61 (0.17-2.65)	0.230
Psychological health	0.69 (0.45-0.93)	0.000	-	-
Social relationship	0.18 (-0.15-0.51)	0.281	0.08 (-0.16-0.33)	0.191
Environment	0.38 (0.17-0.60)	0.000	0.25 (0.22-0.46)	0.000
Physical health	-	-	0.04 (-0.07-0.32)	0.281

P-value <0.05 is considered significant and bolded.
PAD – peripheral artery disease

logical health (p = 0.027). A significantly lower quality of life of patients with peripheral neuropathy was only found in the area of physical health (p = 0.017) (Table 2).

Multivariate linear regression analysis was used to identify independent factors for HRQoL. Table 3 shows that age, psychological health, nephropathy and environment were associated with the domain of physical health. Old age and presence of nephropathy were associated with a lower score on physical health. The patients who perceived their psychological health and environment as good expressed higher scores of physical health. Marital status, place of residence, family size, number of children in family, monthly income, level of education, glycemic control and hyperlipidemia were not associated with the quality of life in the domain of physical health (Table 3).

Younger patients and those with better living conditions had significantly higher psychological domain scores. The determinant of psychological health was also marital status. Place of residence, being a displaced person, family size, number of children in family, monthly income, level of education, disease duration, glycemic control and hyperlipidem-

ia were not associated with quality of life in domains of psychological health (Table 3).

The patients with greater age, who were single, had a lower score, whereas those with a better living environment had higher scores in the domain of social relationship (Table 4). Other variables were not significantly associated with this domain.

Older age, diagnosis of myocardial infarction and better physical and psychological health were associated with higher scores in the environment domain. Marital status, being a displaced person, duration of disease, micro vascular complications, stroke, PAD, diabetic foot, glycemic control and hyperlipidemia were not the determinants of environment domain (Table 4).

The level of glycemic control and gender has not been shown to be significant determinants of any of the four domains.

Discussion

The results of the current study show that the age, psychological health, nephropathy and environment were associated with the physi-

Table 4. Factors associated with quality of life in social relationship and environment domain in patients with type 2 diabetes (Multivariate linear regression analysis)

	Domain			
	Social relationship		Environment	
	B (95% CI)	P-value	B (95% CI)	P-value
Age	-0.34 (-0.60-0.01)	0.004	0.05 (0.01-0.10)	0.014
Gender	0.26 (-0.28-0.79)	0.344	-0.10 (-0.89-0.69)	0.811
Marital status	-0.38 (-0.62--0.13)	0.003	0.29 (-0.08-0.66)	0.127
Nephropathy	0.91 (-0.07-1.89)	0.069	-0.32 (-1.78-1.15)	0.671
Retinopathy	0.09 (-0.50-0.68)	0.765	-0.62 (-1.49-0.25)	0.160
Neuropathy	0.38 (-0.16-0.92)	0.162	0.55 (-0.25-1.35)	0.173
Myocardial infarction	0.26 (-0.57-1.09)	0.532	1.35 (0.14-2.56)	0.029
Stroke	-0.02 (-0.96-0.92)	0.968	-1.26 (-2.63-0.11)	0.071
PAD	-0.37 (-1.13-0.39)	0.341	0.56 (-0.57-1.69)	0.328
Diabetic foot	0.61 (-0.39-1.61)	0.230	-1.33 (-2.81-0.14)	0.076
Psychological health	0.08 (-0.04-0.21)	0.191	0.47 (0.30-0.64)	0.000
Social relationship	-	-	0.55 (0.34-0.77)	0.000
Environment	0.25 (0.15-0.35)	0.000	-	-
Physical health	0.04 (-0.03-0.12)	0.281	0.19 (0.09-0.30)	0.000

cal health. The determinants of psychological health included age and living environment, whereas age, living environment and marital status were associated with the score in the domain of social relationship.

As stated by Polonsky [14], the relationship between HRQoL and diabetes is bidirectional – aspects of diabetes may negatively impact the HRQoL, and an impaired HRQoL may negatively influence diabetes management and health outcomes. Therefore, it is important to analyze and understand the HRQoL determinants in order to improve the quality of care for patients and treatment outcomes.

Some studies found that a better glycemic control was associated with a better HRQoL, and that complications were the most important disease-specific determinant of HRQoL [15,16], whereas other authors found no significant relationship between the HRQoL and glycemic control [17,18]. In the present study, the effect of poor blood glucose control was not seen to be associated with any of the domains, and diabetes duration had no impact on the HRQoL.

Numerous studies have found that the most important determinants of the HRQoL are macrovascular complications. In the study conducted by Huang et al. [19], it was shown that complications of diabetes had the greatest impact on the patient's life, and that a comprehensive treatment of diabetes and the prevention of its complications could significantly improve the quality of life. A Norwegian study, conducted on 1000 patients with type 1 and 2 diabetes, also showed that the presence of complications had the most significant effect on patients' quality of life [20]. In this study t-independent test revealed the relationship between the peripheral artery disease and all four domains, nephropathy with physical and psychological health and neuropathy with physical health, respectively, but multivariate analyses selected these variables as insignificant determinant factors for the HRQoL.

Socioeconomic factors were important determinants of the HRQoL. Age had a strong effect on social relationships and the physically oriented domain. Audureau et al. [21] have shown a decrease in psychological health

in people older than 65 years of age. In the present study patients older than 65 years had significantly lower score in physical, psychological and social domains in comparison with those younger than 65. Collins et al. [22] showed that older age might be associated with higher diabetes-related HRQoL scores, although this statistically significant association was diminished after adjusting for relevant factors. Sundaram et al. [23] also reported that older age (60 years of age) was independently associated with higher HRQoL scores in a multivariate analysis. In the present study, no differences between genders were seen in any domains, which is inconsistent with findings in other studies [18].

Environment was strong determinant factor for physical and psychological health and social relationships. The score on environment was strongly associated with monthly incomes, family size and number of children, whereas a weak association was found with education. Thus, people with type 2 diabetes are particularly at risk to have an impaired HRQoL in part due to these socioeconomic factors which are not modifiable by medical intervention [11]. Also, we could say that HRQoL is a time-dependent variable and should be repeatedly measured in patients with type 2 diabetes to ensure reliable estimations.

These results indicate that in addition to the parameters analyzed in the study there might be other parameters that significantly affect the quality of life in patients with type 2 diabetes mellitus and that need to be looked at. Some of them might be patient's perspective, ideas and expectations of diabetes management. Diabetes management requires dietary modification, daily or weekly glucose monitoring, exercise integration, regular check-ups and self-care. Many Bosnian patients find these requirements constraining since they hinder their lifestyle flexibility. Even the patients with optimal glycemic control often report poor quality of life due to the difficulties of implementing these lifestyle changes. The findings by Hanninen et al. [24] indicate that continuity in care may improve HRQoL, which is encouraging as this is one of the most prominent features of well-functioning primary health care.

There is the complex interplay between the medical, physical, psychological and social aspects of the disease that must be considered while taking care of the patients with diabetes. Understanding this interplay may be useful in communicating with patients about the impact that diabetes and its treatment will have on HRQoL domains in the future.

This study has several limitations. Since it was a cross-sectional study, it cannot determine causality. The study sample consisted only of patients from the region of Banja Luka, so the results might not be generalized to all patients in Bosnia and Herzegovina. The HRQoL was measured at a single point in time and it is possible that the assessment of individual's own perceptions changes over time. This study did not mention the lifestyle factors such as diet, smoking and physical activity.

The future studies need to determine the factors that lead to deterioration of HRQoL and find the way through quality improvement interventions to eradicate or at least minimize the effects of these factors.

Conclusion

The factors associated with the different domains of quality of life in patients with type 2 diabetes are multiple, but mainly relate to age, living environment and diabetes complications. Some psychosocial factors, such as social support and proper living conditions, may have a strong effect on quality of life, buffering the negative impact of diabetes. Developing interventions that take into account patients' characteristics and the main contributing factors may constitute an important instrument to improve the HRQoL of patients with diabetes.

The authors declare no conflicts of interest.
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Procjena kvaliteta života vezanog za zdravlje kod odraslih pacijenata sa tipom 2 dijabetes melitusa

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Uvod. Cilj rada je istražiti potencijalne determinante kvaliteta života bolesnika sa tipom 2 dijabetesa u primarnoj zdravstvenoj zaštiti.

Metode. Studija presjeka je uključila pacijente sa tipom 2 dijabetesa registrovanih u porodičnoj medicini. Procjena zdravstvenog statusa je obuhvatila anamnezu, fizikalni pregled, laboratorijske analize, pregled očnog dna, skrining distalne simetrične neuropatije i mjerenje brahijalnog indeksa gležnja. Kvalitet života bolesnika ispitan je generičkim instrumentom WHOQOL-BREF. Multivarijantna linearna regresiona analiza je korićena za analizu varijabli udruženih sa kvalitetom života.

Rezultati. Od 181 odraslog bolesnika sa tipom 2 dijabetesa, 73(40,3%) je imalo dijabetes kraće od 5 godina. Prosječna vrijednost glikoziliranog hemoglobina (A1C) je iznosila 7,55%, a srednje vrijednosti glikemije našte, ukupnog holesterola, LDL-holesterola, HDL-holesterola i triglicerida su bile iznad preporučenih vrijednosti. Rezultati multivarijantne regresione analize pokazuju da su dob, psihološko zdravlje, nefropatija i životno okruženje udruženi sa domenima fizičkog zdravlja. Determinante psihološkog zdravlja su bile dob, bračni status i životno okruženje. Starije osobe i samci su imali lošiji skor u domenima socijalnih veza. Nivo kontrole glikemije i pol nisu bile značajne determinante nijednog od četiri domena kvaliteta života.

Zaključak. Faktori udruženi sa različitim domenima kvaliteta života su brojni, uglavnom vezani za dob, životno okruženje i hronične komplikacije dijabetesa. Dobijeni rezultati se mogu koristiti za definisanje mjera kojima bi se poboljšao kvalitet života bolesnika sa tipom 2 dijabetesa.

Ključne riječi: diabetes mellitus tip 2, kvalitet života vezan za zdravlje, socio-ekonomski faktori, WHOQOL-BREF