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The quality of life of patients with type 2 diabetes mellitus

Key words:

quality of life,
diabetes mellitus,
glycemic control,
duration of the disease

Abstract

Introduction: Quality of life is an important health outcome in its own right, representing the ultimate goal of all health interventions. Diabetes mellitus significantly affects the quality of life of patients.

Objective: To evaluate the quality of life in patients suffering from type 2 diabetes mellitus in relation to the duration of the disease and the degree of glycemic control.

Method: A prospective - descriptive study was conducted by interviewing patients with diabetes mellitus type 2, registered with two family medicine practices based at Family Medicine Teaching Center Banja Luka, as well as taking data from their medical records, during the period of 01.08 - 31.12.2011. As the instruments for this research the questionnaire SF-36 (for assessing the quality of life) and general questionnaire that contained data on age, sex, disease duration, Body Mass Index (BMI), glucose and HbA1c values were used. The patients were divided into 3 groups according to the duration of the disease. The first group included patients with a disease duration of up to 5 years, the second group with disease duration of 6-13 years and a third group of patients who have had diabetes 14 or more years.

Results: The study included 95 patients suffering from type 2 diabetes mellitus. There were 42 (44%) male patients and 53 (56%) female patients. The HbA1c values taken from the patient's health records were used as a parameter for the control of diabetes. The target HbA1c value of <6.5 mmol/L was found in only 13 patients, with a HbA1c 6.6 to 7.5 mmol/L in 44 patients, and a HbA1c value of over 7.5 mmol/L in 38 patients. In relation to the duration of disease, statistically significant differences between the formed groups in any of the functional areas were not found. Among patients in the groups formed according to the degree of glycemic control statistically significant differences were found in the following areas of functioning: energy/fatigue ($p=0.006$), emotional functioning ($p=0.008$), social functioning ($p=0.040$) and pain ($p=0.042$).

Conclusion: The duration of the disease does not affect the quality of life of patients suffering from type 2 diabetes mellitus, but degree of glycemic control is affecting the quality of life in patients. However patients with the best glycemic control did not have the best quality of life.

Introduction

In 1948 the World Health Organization defined health from a new perspective, defining health not only by absence of disease and infirmity, but also by the presence of physical, mental and social well-being¹. Quality of life is an important health outcome in its own right, representing the ultimate goal of all health interventions. Persons with diabetes have lower quality of life than persons without chronic illness, but their quality of life is better than in patients with other serious chronic diseases². Duration and type of diabetes are not consistently associated with quality of life; on the other hand better glycemic control is correlated with better quality of life. The diabetes complications are the most important disease-specific determinate of quality of life^{3,4}. People with diabetes often feel challenged by their disease and its day-to-day management demands. Patients suffering from diabetes, deal with their condition on a daily bases, having to make countless decisions in an often futile effort to approach the non-diabetic metabolic state⁵. Diabetes therapy, such as insulin, can substantially affect quality of life positively by reducing symptoms of high blood sugar, or negatively by increasing symptoms of low blood glucose^{6,7}.

Two broad approaches to health-related quality of life measurement have emerged-generic and disease specific. The most widely used generic measure of quality of life in studies of people with diabetes is the Medical Outcomes Study (MOS) Short-Form-General Health Survey (SF-36). The MOS instrument includes physical, social and role functioning scales to capture behavioral dysfunction caused by health problems. Measure of mental health, perception of overall health and pain intensity reflect more subjective components of health and general well-being⁸.

A number of studies had the goal of examining the effect of different factors on the quality of life of patients with diabetes. Recently, the ROSSO-in-praxi Study demonstrated that addition of Self-monitoring of blood glucose (SMBG) to a 12-week lifestyle intervention was associated with significant improvements in glucometabolic control and quality of life in insulin-naive patients with type 2 diabetes mellitus (T2DM)⁹.

Education about self control had a major impact on controlling the disease and the patient's quality of life. The results of one meta - analysis showed that patients who were well educated about how to control their diabetes had better glycemic control and quality of life than control group¹⁰.

Objective

The aim of the study was to examine the quality of life of patients with type 2 diabetes mellitus in relation to the duration of the disease and degree of glycemic control.

Method

A prospective, descriptive study was conducted by interviewing patients with type 2 diabetes mellitus, who were registered with two family medicine practices based at the Family Medicine Teaching Center Banja Luka, as well as taking data from their medical records. The study was conducted during the period of 01. 08. - 31.12. 2011.

The questionnaire SF-36 was used to assess quality of life and general questionnaire (developed specifically for this study) was used to collect the additional data of age, gender, duration of disease, Body Mass Index (BMI), glucose and HbA1c values.

Questionnaire SF-36 was made up of 36 questions in 8 areas:

1. Physical functioning;
2. Limitations in performing daily activities due to physical health problems;
3. The presence of pain
4. General state of health;
5. Limitation in social activities due to physical or emotional problems;
6. Emotional functioning;
7. Limitation in common activities due to emotional problems;
8. Vitality (energy and fatigue).

These eight areas of functioning encompass the state of physical and mental functioning. The state of physical functioning consists of the areas of physical functioning, limitation of activities due to physical health problems, the presence of pain, and the general state of health. The area of mental functioning is made of the areas of vitality (energy/fatigue), social functioning, emotional functioning, and the limitation of common activities due to emotional problems⁸.

The patients were divided into 3 groups according to the duration of the disease. The first group included patients with a disease duration up to 5 years, the second group with disease duration of 6-13 years and a third group of patients who had diabetes for 14 or more years.

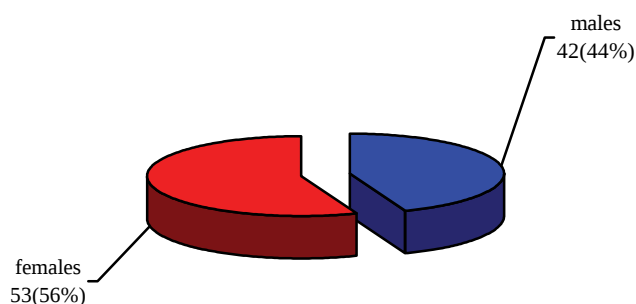
Such distribution of groups was created to facilitate statistical analysis.

Statistical analysis

Descriptive analysis in the form of frequencies and percentages was used to view the sample and the formation of certain categories of patients, depending on the duration of diabetes and HbA1c values. The differences between diabetic patients regarding to disease duration and HbA1c values were analyzed by using ANOVA test. If difference between variance was significant nonparametric Kruskal-Wallis test was used. For all data analysis values was used $P < 0.05$.

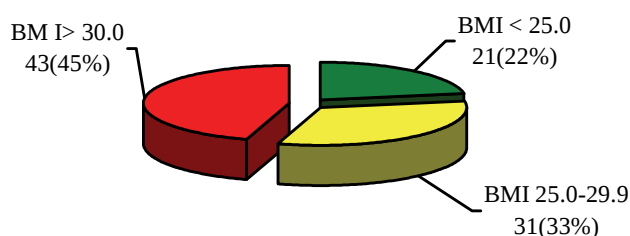
Results

The study included 95 patients; 42 (44%) were male, and 53 (56 %) were female (Graph 1).



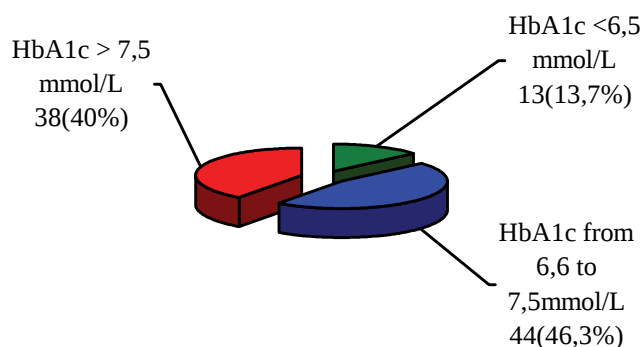
Graph 1. Gender distribution of examinees

Forty-one patients were on insulin therapy and 54 patients on drug therapy. Of total 95 patients included in the study 21 (22.1%) had a BMI $< 25.0 \text{ kg/m}^2$, 31 (32.63%) had a BMI 25.0 to 29.9 kg/m^2 , and 43 (45.26%) were obese with a BMI $> 30.0 \text{ kg/m}^2$ (Graph 2).



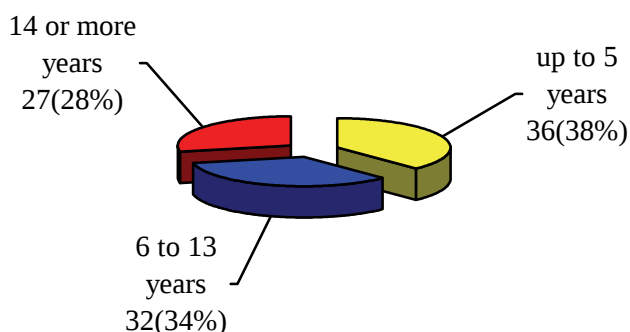
Graph 2. BMI of the patients in the study

The patient's HbA1c values were acquired from their medical records. Only 13 patients had the ideal HbA1c ($< 6.5 \text{ mmol/L}$), 44 patients had HbA1c values 6.6 to 7.5 mmol/L , and 38 patients had HbA1c $> 7.5 \text{ mmol/L}$ (Graph 3).



Graph 3. Percentages of HbA1c values

According to the duration of disease patients were divided into three groups. The first group included patients who had the disease up to 5 years (36 patients), the second group included patients who had the disease for 6 to 13 years (32 patients) and the third group were patients who had the disease 14 years or more (27 patients) (Table 1, Graph 4).

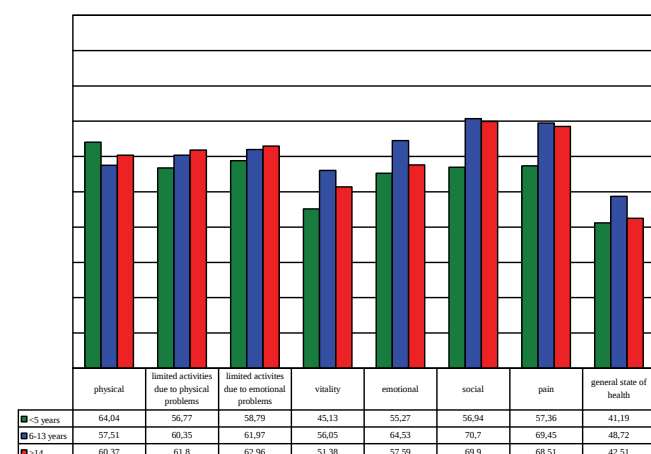


Graph 4. The percentages of patient with different duration of disease

Statistically significant differences in quality of life between the groups with different duration of disease in any of the areas of functioning were not found (Table 1, Graph 5).

Table 1. Results in the areas of functioning in relation to duration of disease

Areas of functioning	Duration of disease (years)	N	M	SD	p
Physical	< 5	36	64,04	27,18	0,708
	6 -13	32	57,51	31,92	
	≥14	27	60,37	31,80	
Limitations in performing every day activities due to physical health problems	< 5	36	56,77	22,82	0,505
	6 -13	32	60,35	28,86	
	≥14	27	61,80	28,18	
Limitation in common activities due to emotional problems	< 5	36	58,79	27,09	0,740
	6 -13	32	61,97	31,60	
	≥14	27	62,96	29,89	
Vitality (energy and fatigue)	< 5	36	45,13	26,09	0,230
	6 -13	32	56,05	27,51	
	≥14	27	51,38	25,19	
Emotional	<5	36	55,27	28,35	0,397
	6-13	32	64,53	23,63	
	≥14	27	57,59	25,92	
Limitation in social activities due to physical or emotional problems	< 5	36	56,94	27,62	0,075
	6 -13	32	70,70	30,55	
	≥14	27	69,90	29,67	
The pain presence	< 5	36	57,36	27,69	0,124
	6 -13	32	69,45	24,99	
	≥14	27	68,51	24,72	
General state of health	< 5	36	41,19	16,75	0,090
	6 -13	32	48,72	20,88	
	≥14	27	42,51	18,94	



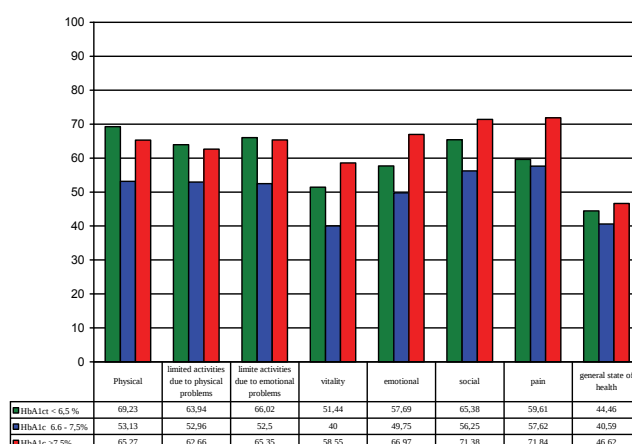
Graph 5. Results in the areas of functioning in relation to duration of disease

In summary areas of physical and mental functioning, the statistical significant differences were not found between the groups based on duration of disease (Table 2).

Table 2. Summary of results of physical and mental functioning in relation to duration of disease (expressed in the form of the standard deviation)

Areas of functioning	Duration of Disease (years)	N	M	SD	p
Physical	< 5	36	54.84	19.71	0.562
	6 -13	32	59.01	23.53	
	≥14	27	58.30	23.46	
Mental	< 5	36	54.03	23.92	0.298
	6 -13	32	63.31	26.26	
	≥14	27	60.46	24.14	

Statistically significant differences there were found in the following areas of functioning: energy/fatigue ($p=0.006$), emotional functioning ($p=0.008$), social functioning ($p=0.040$) and pain ($p=0.042$). The lowest level in functioning in the area of energy/fatigue was found in patients with HbA1c values of 6.6% to 7.5% ($p=0.006$), and the highest level in functioning was in patients with HbA1c values over 7.6% ($p=0.006$). In the area of emotional functioning ($p=0.008$), social functioning ($p=0.040$), and pain ($p=0.042$), the highest level in functioning was found in patients with HbA1c values of over 7.6%, and the lowest in patients with HbA1c values of 6.6 to 7.5% (0.081)(Table 3, Graph 6).



Graph 6. Results in the areas of functioning in relation to glycemic control

Table 3. Results in the area of functioning in relation to glycemic control

Area of functioning	HbA1c value (%)	N	M	SD	p
Physical	< 6.5	13	69,23	26,83	0,071
	6.6 -7.5	44	53,13	30,30	
	≥7.6	38	65,27	30,26	
Limitations in doing every day activities due to physical health problems	< 6.5	13	63,94	25,78	0,234
	6.6 -7.5	44	52,96	28,02	
	≥7.6	38	62,66	24,07	
Limitation in common activities due to emotional problems	< 6.5	13	66,02	29,15	0,081
	6.6 -7.5	44	52,50	27,81	
	≥7.6	38	65,35	29,48	
Vitality (energy and fatigue)	< 6.5	13	51,44	26,04	0,006
	6.6 -7.5	44	40,00	21,73	
	≥7.6	38	58,55	27,77	
Emotional	< 6.5	13	57,69	27,43	0,008
	6.6 -7.5	44	49,75	23,58	
	≥7.6	38	66,97	25,77	
Limitation in social activities due to physical or emotional problems	< 6.5	13	65,38	31,93	0,040
	6.6 -7.5	44	56,25	26,85	
	≥7.6	38	71,38	30,04	
The pain presence	< 6.5	13	59,61	26,47	0,042
	6.6 -7.5	44	57,62	25,90	
	≥7.6	38	71,84	25,32	
General state of health	< 6.5	13	44,46	20,46	0,462
	6.6 -7.5	44	40,59	18,51	
	≥7.6	38	46,62	19,22	

Statistically significant differences in the area of physical functioning were not found between the formed groups according their HbA1c values. Statistically significant differences in the area of mental functioning were found between the groups. The least amount of difficulty in mental functioning was found in the group with HbA1c values > 7.6% (p = 0.069), with the greatest level of difficulty found in the group of patients with HbA1c values 6.6 - 7.5% (p=0.013) (Table 4).

Table 4. Summary of results of physical and mental functioning in relation to degree of glycoregulation (expressed in the form of the standard deviation)

Areas of functioning	HbA1c values	N	M	SD	p
Physical	< 6.5	13	59.31	22.60	0.069
	6.6 -7.5	44	51.08	21.5	
	≥7.6	38	61.60	22.07	
Mental	< 6.5	13	60.13	25.90	0.013
	6.6 -7.5	44	49.62	21.41	
	≥7.6	38	65.56	25.32	

Discussion

The results of a number of studies show that the duration of disease has an effect on quality of life in patients with type 1 & 2 diabetes mellitus. The longer disease duration lowers patient's quality of life^{11,12}. Finish study conducted on patients with type 1 diabetes using the Finish version of the questionnaire SF-20, or Swedish study of patients with type 2 diabetes mellitus, found no correlation between the duration of the disease and quality of life^{13,14}, what is in accordance with the results of our study which showed no statistically significant differences in any areas of functioning in the groups formed on the basis of duration of disease.

The results of the research presented by Wikblad and coworkers, using the Swedish Quality of Life Scale (SWEDQUAL), showed that the lowest quality of life was found in patients with the worst glycemic control and levels of HbA1c >8.1%. The best quality of life was found in patients with levels of HbA1c 7.1 - 8.0%, and those with HbA1c values <7.0% was in the middle¹⁵. Van der Doers and coworkers found that lower emotional functioning is connected to lower HbA1c values¹⁶ and Peyrot and coworkers showed significant connection between quality of life and degree of glycemic control based on the HbA1c values¹⁷.

In the study conducted by Weineberger and coworkers (the questionnaire SF-36 was used), the connection between the degree of glycemic control and quality of life in patients with diabetes was not found¹⁸. The UKPDS studies¹⁹, which were researching the quality of life in patients with diabetes, did not find the connection between poor glycemic control and increased fatigue in patients on both conventional and intensive therapies²⁰. Also, the connections between high HbA1c levels and lower quality of life, poorer emotional state, or overall general health were not detected²¹.

In our study, among patients in the groups formed by the degree of glycemic control the statistically significant differences were found in mental functioning, energy/fatigue,

emotional functioning, social functioning and pain, but differences were not significant in the area of physical functioning.

However, the results of our study did not show a significant correlation between the optimal degree of glycemic control and good quality of life in patients suffering from diabetes. The patients with optimal HbA1c levels had more difficulties in functioning compared to the patients with sub-optimal HbA1c levels.

These results also indicate, in addition to the parameters analyzed in the study, that other factors, that need to be looked at, were significantly affecting the quality of life in patients with type 2 diabetes mellitus. 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 and even the patients with optimal glycemic control often report poor quality of life due to the difficulties of implementing these lifestyle changes.

Motivational counseling, structured continuing education and support for diabetic patients might address some of these issues.

Some studies yet have shown that the presence of complications (microvascular or macrovascular) significantly affects the patient's quality of life. In the study of Huang

and coworkers it was shown that complications of diabetes have the greatest impact on the patient's quality of life and that comprehensive treatment of diabetes and prevention of its complications could significantly improve the quality of life²². Norwegian study, on 1000 patients with type 1 and 2 diabetes, also showed that the presence of complications had the most significant effect on patient's quality of life. The complications greatly affecting the quality of life include: heart attacks, strokes, and diabetic neuropathies²³. Other studies have dealt with the effect of the presence of comorbidity on quality of life in patients with diabetes, one of which showed that presence of comorbidity and insulin therapy significantly lowers patient's quality of life²⁴.

Conclusion

The results of this study showed that the duration of disease does not affect quality of life of patients with type 2 diabetes mellitus. The degree of glycemic control based on the HbA1c values does affect the quality of life in patients. However patients with the best glycemic control did not have the best quality of life. The obtained results show that in addition to these parameters, other factors (the presence of complication, comorbidity) significantly affect the quality of life in patients with type 2 diabetes mellitus.

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Квалитет живота пацијената са дијабетес мелитусом тип 2

Кључне речи:

квалитет живота,
дијабетес мелитус,
контрола гликемије,
дужина трајања болести

Сажетак

Увод. Квалитет живота је важан здравствени исход и представља коначни циљ свих здравствених интервенција. Дијабетес мелитус значајно утиче на квалитет живота обољелих.

Циљ рада. Испитати квалитет живота пацијената обољелих од дијабетес мелитуса тип 2 у односу на дужину трајања болести и степен гликорегулације.

Метод. Истраживање је проспективно-дескриптивна студија, проведена методом анкетирања пацијената обољелих од дијабетес мелитуса тип 2, регистрованих у два тима Едукативног центра породичне медицине Дома здравља Бања Лука, и узимањем података из њихових здравствених картона у периоду од 01.08. - 31.12.2011. године. У истраживању је коришћен SF-36 упитник за процену квалитета живота и упитник који садржи податке о старости, полу, дужини трајања болести, индексу телесне масе (*BMI*), вредностима гликемије и гликозилираног хемоглобина (*HbA1c*). Према дужини трајања болести, испитаници су подељени у три групе. Прва група је укључила пацијенте који имају обољење пет или мање година, друга пацијенте који имају обољење 6 до 13 година и трећа група пацијенте који имају дијабетес 14 година или дуже.

Резултати. Истраживањем је обухваћено 95 пацијената оболелих од дијабетес мелитуса тип 2 - 42 (44%) мушкарца и 53 (56%) жене. Циљне вредности *HbA1c* ($<6,5 \text{ mmol/L}$) имало је 13 испитаника, вредности од 6,6 до 7,5 mmol/L 44 испитаника, а вриједности веће од 7,5 mmol/L 38 испитаника. У односу на дужину трајања болести, није пронађена статистички значајна разлика између формираних група испитаника ни у једној области функционисања. Статистички значајна разлика у односу на степен гликорегулације пронађена је у следећим областима функционисања: енергија/замор ($p=0,006$); емоционално функционисање ($p=0,008$); социјално функционисање ($p=0,040$) и болови ($p=0,042$).

Закључак. Дужина трајања болести не утиче на квалитет живота пацијената оболелих од дијабетес мелитуса тип 2. Степен гликорегулације утиче на квалитет живота. Међутим, пацијенти са најбољом гликорегулацијом нису имали и најбољи квалитет живота.

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