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ORIGINAL PAPER

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Skin Changes in Patients with Diabetes Melitus Type 2 and their Impact on Quality of Life

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ABSTRACT

Introduction: Changes in the skin can occur as part of a diabetic, metabolic disorder or diabetic complications. Studies have shown that diabetes has an extremely strong negative impact on quality of life, especially diabetes with complications. **Aim:** Examine the impact of skin changes in patients with type 2 diabetes mellitus on quality of life. **Methods:** A prospective study analysed the quality of life in 200 respondents with type 2 diabetes mellitus which had diabetes-related skin changes. Subjects were divided into four groups according to the type of skin changes associated with diabetes mellitus. Group 1 consisted of patients which had skin changes with a greater or lesser association with diabetes mellitus, group 2 patients with infections, group 3 patients with cutaneous manifestations of diabetic complications and group 4 patients with allergic reactions to antidiabetic therapy. Quality of life assessment was performed using the Skindex-29 questionnaire, and the Nijsten categorization was used to assess the impact of skin changes in patients with type 2 diabetes mellitus on quality of life. **Results:** There were (51.95%) respondents in group 1, group 2 (24.02%), group 3 (22.22%) and group 4 (1.8%) respondents. In the scale of emotions in 84 respondents (43.0%) the impact on quality of life was serious, in the scale of symptoms in 96 (48%) was moderate, and in the scale of social and physical functioning 106 (55%) also had a moderate impact on quality of life, as well as in the total score of 94 respondents (47%). There was a statistically significant difference in the scale of social and physical functioning in the presence of skin changes in group 1 ($\chi^2 = 7.95$; $df = 3$, $p = 0.045$) and group 3 ($\chi^2 = 12.48$, $df = 3$; $p = 0.006$), and in the total score of Skindex-29 when it comes to changes in the skin of group 3 ($\chi^2 = 7.26$, $df = 3$, $p = 0.05$). **Conclusion:** the quality of life in

patients with type 2 diabetes mellitus which have skin changes is significantly reduced.

Keywords: type 2 diabetes mellitus, skin changes, quality of life, Skindex-29.

1. INTRODUCTION

Diabetes mellitus (DM) or "sugar disease" is a chronic metabolic disease characterized by elevated blood sugar levels and disorders in the metabolism of carbohydrates, fats and proteins due to absolute or relative lack of insulin, disorders of insulin action - resistance or a combination of both (1). Changes in the skin or dermatosis can occur as part of diabetic, metabolic disorders or diabetic complications (microangiopathy, macroangiopathy, polyneuropathy). Skin changes associated with diabetes can be divided into four main groups: a) changes with a greater or lesser association with diabetes; b) skin infections; c) cutaneous manifestations of diabetic complications; d) allergic reactions to antidiabetics (2). Some authors add a fifth group, endocrine syndromes with skin changes and diabetes, which include migrating necrotic erythema in glucagonoma, skin atrophy, stretch marks and hirsutism in Cushing's syndrome, thickened skin and increased sweating in acromegaly, ataxia telangiectasia, symptomatic prurigo in endocrine diseases, lipodystrophy in rare endocrine syndromes and diabetes (3). The first group where there are changes with a greater or lesser connection with diabetes includes: diabetic dermopathy, prurigo, granuloma annulare, lichen ruber planus, dermatitis bullosa diabeticorum, scleredema adultorum, perforative dermatoses. The second group includes infections with bacteria, fungi, viruses and infestations such as scabies. The third group is diabetic complications

with ulcerations, onychodystrophy, alopecia, effluvium and xerosis of the skin. Allergic and non-allergic skin changes in diabetics caused by drug therapy belong to the fourth group.

According to the WHO, quality of life is defined as the perception of an individual’s role in the context of the culture and values in which he or she lives, and in relation to his or her goals, expectations, standards, and preoccupations.

Quality of life itself is widely recognized as a very important component of health status in people with diabetes mellitus, where patients carry a huge burden of a very demanding regime and disease management (4). Initially, studies on diabetes focused on studying the quality of life in people with diabetes mellitus with serious complications of the disease itself, such as patients on haemodialysis, who had a kidney transplant or had their foot or leg amputated. Subsequent studies have focused more on the psychological impact of the disease itself on quality of life, which strived to understand the patient’s ability to cope with a complicated and demanding treatment regimen. Studies have shown that diabetes has an extremely negative impact on quality of life, especially diabetes with complications (5). Diabetic polyneuropathy negatively affects quality of life. The quality of life of patients with polyneuropathy of mostly mixed pathogenesis and sensorimotor type becomes poorer for these reasons even when patients do not have clinically manifested polyneuropathy, but it has been verified by electromyoneurography (6). A strong association of ulcerations on the foot over 5 cm in diameter has been proven as a common long-term complication of diabetes and quality of life especially the physical component (7). Most of these studies on the association between quality of life and diabetes mellitus have been conducted in developed countries, and only rarely in developing countries (8). The outcome of the reaction to the disease depends on many factors: the personality of the individual, the type and severity of the disease, the external circumstances in which he lives, the family’s reaction to the patient and his illness. Not surprisingly, the emotional response to diabetes often complicates treatment. On the one hand, the first reaction may be non-acceptance of the disease and refusal to cooperate. The other extreme is excessive preoccupation with the disease. The physician should make an effort to determine a middle ground so that the patient accepts his illness and reacts reasonable, without the disease becoming an obsession for him. The goal is to live with diabetes, not for it (9).

A person who achieves a successful emotional adjustment will sooner or later reach the point of accepting his illness. Of course, the life of every person with diabetes is unique. Most patients manage the disease actively and effectively, but almost every person with diabetes mellitus feels strongly its impact on life and carries a huge burden of this very demanding disease (10).

2. AIM

To examine the impact of skin changes in patients with type 2 diabetes mellitus on quality of life.

3. MATERIAL AND METHODS

The prospective study included 200 patients with type 2 diabetes mellitus with skin changes associated with diabe-

tes, both genders, aged 20–60 years, treated at the Department of Skin and Venereal Diseases of the Cantonal Hospital “Dr. Irfan Ljubijankić” in Bihać. Subjects were divided into four groups according to the type of skin changes associated with diabetes mellitus. Group 1 consisted of patients with skin changes with a greater or lesser association with diabetes mellitus, group 2 patients with infections, group 3 patients with cutaneous manifestations of diabetic complications and group 4 patients with allergic reactions to antidiabetic therapy.

Quality of life assessment was performed using the Skindex-29 questionnaire, a questionnaire for measuring the quality of life in patients with skin diseases consisting of 30 questions classified into three scales (emotion scale, symptom scale and social and physical functioning scale). The emotion scale has 10 questions, the symptom scale has 7 questions, and the functioning scale has 12 questions. Patients will answer the questions with: never, rarely, sometimes, often and constantly. The answer Never will be scored with 0, Rarely with 25, Sometimes with 50, Often with 75, and Constantly with 100 points. All answers will be transferred to a linear scale of 100, ranging from 0 (no impact) to 100 (experienced impact all the time). Therefore, each statement can have a minimum score of 0 and a maximum score of 100. The score of the scale will be calculated as the mean value of the patient’s answers to the questions in the given scale. The cumulative score will be calculated as the average value of the scores of all three scales (11). The Nijsten categorization was used to assess the impact of skin changes in patients with type 2 diabetes mellitus on quality of life (12).

All respondents were introduced with the goals and nature of the research, the method of research and their permission and consent to participate in the research was sought. The research was approved by the Commission for Ethical Issues of the Cantonal Hospital “Dr Irfan Ljubijankić” in Bihac.

Categorization	Symptom scale	Emotion scale	Scale of social and physical functioning	Cumulative score
Very small	<3	<5	<3	<5
Mild	4-10	6-24	4-10	6-17
Moderate	11-25	25-49	11-32	18-36
Serious	26-49	>50	>33	>37
Very serious	>50	-	-	-

Table 1. Categorization of the impact of diabetes-related skin changes on quality of life according to Nijsten

Statistical analysis

Statistical analysis was performed in the software package SPSS 22.0 (Armonk, NY: IBM Corp). Descriptive statistics parameters were used to display the basic characteristics of the sample. Student’s t-test was used to compare quantitative variables where possible, otherwise the Mann-Whitney test was used. The chi-square or Fisher test was used to compare categorical variables. For comparisons of multiple variables, either ANOVA or its nonparametric alternative Friedman test was used. The statistical correlation between the variables was tested using Spearman’s

correlation test. The level of statistical significance of 95% ($p < 0.05$) was considered as the limit of significance for all statistical tests.

4. RESULTS

In the overall sample, a prospective study examined 200 subjects with type 2 diabetes mellitus which had skin changes associated with diabetes. There was a total of 122 (61%) female and 78 (39%) male respondents in the sample, with a M: F ratio of 1.56: 1. Subjects were divided into four groups according to the type of skin changes. There were (51.95%) respondents in group 1, group 2 (24.02%), group 3 (22.22%) and group 4 (1.8%) respondents.

The values of the skindex-29 score and its sub-scores were compared, with regard to the presence of skin changes in each group.

When comparing the scores with regard to the presence of skin changes belonging to group 1, a significant difference was found when it came to the scale of social and physical functioning 26.86 ± 16.93 , $p = 0.01$, and in the scale of emotions 31.05 ± 17.18 ; $p = 0.87$, symptom scale 36.22 ± 19.80 ; $p = 0.13$ and overall skindex-29 31.45 ± 15.32 , $p = 0.10$ the difference was not statistically significant. In the presence of changes belonging to group 2, there was no difference in the scales nor in the complete value of the Skindex score. In the emotion scale 30.97 ± 17.61 ; $p = 0.88$, symptom scale 37.82 ± 19.46 ; $p = 0.98$, scale of social and physical functioning 27.73 ± 17.44 ; $p = 0.37$ and total skindex-29 score 32.15 ± 15.96 ; $p = 0.66$. However, in the case of changes belonging to group 3, again a significant difference was found when it came to the scale of social and physical functioning 35.94 ± 18.88 ; $p < 0.001$, and in the emotion scale 31.49 ± 15.73 ; $p = 0.86$, symptom scale 38.76 ± 19.28 ; $p = 0.62$ and total skindex-29 score 35.36 ± 15.32 ; $p = 0.09$ there was no significant difference. When it came to changes that belonged to group 4, no differences were found in the values of the scales and the total Skinindex score. In the emotion scale 23.75 ± 12.22 ; $p = 0.27$, symptom scale 47.37 ± 16.04 , $p = 0.23$, social and physical functioning scale 29.81 ± 18.75 ; $p = 0.94$ and total Skindex score 34.29 ± 14.95 ; $p = 0.81$.

In addition, the frequency of individual categories of the level of the influence of skin changes according to Nijsten was analysed, considering the presence of skin changes in a certain group. Only Tables 2, 3, 4 are shown in which a statistically significant difference was detected. Thus, significant differences in the frequency of different categories of skin-changes-level-impact were detected in the scale of social and physical functioning where skin changes of type 1 and 3 were present, and in the overall Skindex when it came to skin changes of type 3.

Quality of life is also compared between the genders. As it can be observed, there were no differences in the average values of the scores between male and female subjects. On the emotion scale for M 30.91 ± 17.62 ; F 31.39 ± 16.52 ($p = 0.85$), symptom scale M 38.45 ± 20.96 ; F 37.34 ± 18.99 ($p = 0.70$), scale of social and physical functioning M 31.67 ± 20.59 ; F 27.64 ± 16.24 , ($p = 0.13$) and total skindex-29 score M 33.72 ± 17.45 ; F 32.16 ± 14.17 , ($p = 0.49$).

5. DISCUSSION

Type 2 diabetes mellitus is a chronic disease that affects the perception of general health and the feeling of well-being in several ways. For example, numerous dietary restrictions, i.e., diabetic diet, then daily self-monitoring and management of disease treatment, as well as oral therapy or the use of insulin can adversely affect the quality of life of patients. In addition, time spent with diabetes and the occurrence of complications of diseases such as nephropathy, neuropathy, heart disease and stroke disrupt health status and negatively affect quality of life (13). Patients with type 2 diabetes mellitus have a poorer quality of life than people without chronic diseases but a better quality of life than those with a large number of other more serious chronic diseases. The dura-

		Scale of social and physical functioning				Total	
		Very small	Mild	Moderate	Serious		
Skin changes of group 1	No	N	3	3	31	33	70
		%	27.3%	21.4%	29.2%	47.8%	35.0%
	Yes	N	8	11	75	36	130
		%	72.7%	78.6%	70.8%	52.2%	65.0%
Total		N	11	14	106	69	200
		%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 2. The frequency of individual categories of the level of the influence of skin changes according to Nijsten, considering the presence of skin changes from group 1 in the scale of social and physical functioning. $X^2=7.95$; $df=3$; $p=0.045$.

		Scale of social and physical functioning				Total	
		Very small	Mild	Moderate	Serious		
Skin changes of group 3	No	N	10	12	75	36	133
		%	90.9%	85.7%	70.8%	52.2%	66.5%
	Yes	N	1	2	31	33	67
		%	9.1%	14.3%	29.2%	47.8%	33.5%
Total		N	11	14	106	69	200
		%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 3. The frequency of individual categories of the level of the influence of skin changes according to Nijsten, considering the presence of skin changes from group 3 in the scale of social and physical functioning. $X^2=12.48$; $df=3$; $p=0.006$

		Skindex total				Total	
		Very small	Mild	Moderate	Serious		
Skin changes of group 3	No	N	1	17	71	44	133
		%	50.0%	65.4%	75.5%	56.4%	66.5%
	Yes	N	1	9	23	34	67
		%	50.0%	34.6%	24.5%	43.6%	33.5%
Total		N	2	26	94	78	200
		%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 4. The frequency of individual categories of the level of the influence of skin changes according to Nijsten, considering the presence of skin changes from group 3 for the overall score Skindex-29. $X^2=7.26$; $df=3$; $p=0.05$

tion and type of diabetes are not always consistent with the quality of life, while complications significantly affect the quality of life. Numerous demographic and psychosocial factors also affect quality of life (14). Jacobson and colleagues studied the association of demographic factors with quality of life. They found no significant difference in gender, level of education, and duration of diabetes. The same study also demonstrated the large impact of the presence of complications of diabetes mellitus on quality of life (15). In our study, regarding the impact of skin changes in respondents on the quality of life according to Nijsten: when it comes to the scale of emotions in the largest number of respondents 84 (43.0%) the impact on quality of life was serious, in the scale of symptoms 96 (48 %) has moderate impact, in the scale of social and physical functioning 106 (55%) also has moderate impact on quality of life, as well as in the overall score Skindex 29 where in most respondents 94 (47%) the impact on quality of life was moderate. There was a statistically significant difference in the frequency of different categories of skin-changes-level-impact on quality of life according to Nijsten in the scale of social and physical functioning in the presence of skin changes from group 1 ($x^2 = 7.95$; $df = 3$, $p = 0.045$) 3 ($x^2 = 12.48$, $df = 3$; $p = 0.006$), and in the total score of Skindex-29 when it comes to changes in the skin from group 3 ($x^2 = 7.26$, $df = 3$, $p = 0.05$).

According to Clouet, the quality of life of patients with type 2 diabetes mellitus compared to the general population is lower in the area of all scales (16). Ware et al find that the quality of life in diabetics is lower than in the general population especially on the scale of physical functioning, limitations due to physical disabilities and perception of general health, while they find no significant differences in social functioning and mental health (17). A French study of all people with diabetes mellitus, regardless of the type of disease and the presence of complications, reported a lower quality of life in diabetics compared to the general population in all dimensions except cognitive functioning (18). In general, we can say that in our study, the quality of life in patients with type 2 diabetes mellitus with skin changes was significantly reduced, especially in the symptom scale when it comes to the total sample, and with a statistically significant difference when it comes to the scale of social and physical functioning in group 1 (skin changes that are more or less related to diabetes) and group 3 (chronic manifestations of diabetic complications), but without significant difference when it comes to gender.

Education is an essential, permanent and never neglected part of the treatment of diabetes mellitus. The goal of education is not only one-sided informing of the patient, but continuous conversation that results in a change in the patient's behaviour and lifestyle. It is constant and continuous regardless of all other components of the treatment. Each form of education needs to be planned in advance, and the success of such program needs to be assessed by tests of knowledge and behaviour, quality of life assessment and with control of metabolic indicators.

6. CONCLUSION

Our study showed that the quality of life in patients with type 2 diabetes mellitus with skin changes is significantly

reduced. The life of every person with diabetes is unique. Most patients manage the disease actively and effectively, but almost every person with diabetes mellitus feels strongly its impact on life and carries a huge burden of this very demanding disease.

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REFERENCES

1. Abeni D, Picardi A, Pasquini P, Melchi CF, Chren MM. Further evidence of the validity and reliability of the Skindex-29: an Italian study on 2242 dermatological outpatients. *Dermatology*. 2002; 204(1): 43-49.
2. Anonymous. The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care*. 1997; 20: 1183-1197.
3. Bourdel- Marchasson I, Dubroca B, Manciet G, Dechamps A, Emeriau JP, Dartiques JF. Prevalence of diabetes and effect of quality of life in older French living in the community: the PAQUID Epidemiological Survey *J Am Geriatr Soc*. 1997; 45: 295-301.
4. Clouet F, Exeler- Cavailher G, Christophe B, Masson F, Fadquel D. Type 2 diabetes and short form 36-items Health Survey *Diabetes Metab*. 2001; 27(6): 711-717.
5. Coffey JT et al. Valuing health-related quality of life in diabetes. *Diabetes Care*. 2002; 25(12): 2238-2243.
6. Garratt AM, Schmidt L, Fitzpatrick R. Patient-assessed health outcome measures for diabetes: a structured review. *Diabet Med*. 2002; 19(1): 1-11.
7. Harrison et al. *Načela interne medicine*, 15. izdanje Beograd, Dijabetes melitus. 2004; 2109-2138.
8. Huntley A. Diabetes in skin disease. In: Drugge R, Dunn H (eds). *The Electronic Textbook of Dermatology*. Available at. 2009; <http://www.telemedicine.org/dm/dmupdate.htm> Accessed August 3.
9. Jacobson AM, de Groot M, Samson JA. The evaluation of two measures of quality of life in patients with type I and type II diabetes; *Diabetes care*. 1994; 17 (4): 267-274.
10. Loralvaldo M, Bungart NA, Cantarelli SJ, Leandro N, Marcelo M. Diabetes mellitus and cutaneous affections. *An Bras Dermatol*. 2003;78: 735-747.
11. Nijsten T, Sampogna F, Abeni D. Categorization of Skindex-29 scores using mixture analysis. *Dermatology* 2009; 218: 151-154.
12. Ovaryolu N, Akarsu E, Madenci E, Torun S, Ucan O, Yilmaz M. Clinical characteristics of patients with diabetic polyneuropathy: the role of clinical and elektromyographic evaluation and the effect of the various types on the quality of life. 2008; 62(7): 1019-1025.
13. Redekop WK, Koopmanschap MA, Stolk RP, Rutten GE, Wolffenbuttel BH, Niessen LW. Health-related quality of life and treatment satisfaction in Dutch patients with type 2 diabetes. *Diabetes care*. 2002; 25(3): 458-463.
14. Ribu L, Hanestad BR, Moum T, Birkeland K, Rustoen T. Health-related quality of life among patients with diabetes and foot ulcers: association with demographic and clinical characteristics. 2007; 21(4): 227-236.
15. Richard R, Rubin PhD, CDE. *Diabetes and Quality of Life, From Research to Practice/ Diabetes and Quality of Life*. 2000; 13: 21-21.
16. Rubin R. Richard, Mark Peyrot. *Quality of Life and Diabetes*, *Diabetes Metab Res Rev*. 1999; 15: 205-218.
17. Speight J, Reaney MD, Bernard KD. Not all roads lead to Rome- a review of quality of life measurement in adults with diabetes. *Diabet Med*. 2009; 26(4): 315-327.
18. Ware JH, Sherbourne CD. The MOS 36-item Short Form Health Survey (SF-36): Conceptual framework and item selection. *Med Care*. 1992; 30: 473-483.