

Impact of Oral Health Education and a Non-Surgical Periodontal Therapy on the Quality of Life of Patients with Diabetes Mellitus*

SUMMARY

Aim: The aim of the study was to evaluate the impact of oral health education and non-surgical periodontal therapy on the quality of life for a group of patients with type I diabetes mellitus, in Iasi, Romania. **Materials and Method:** The study was conducted on 21 patients with type 1 diabetes mellitus which also presented a form of periodontitis. We examined: the degree of glycaemic control (by measuring the glycated haemoglobin), the periodontal and oral hygiene parameters at the baseline and after 4 weeks, 6 months and 12 months after the periodontal treatment which consisted in scaling and root planing. The patients also filled an OHIP-14 questionnaire at baseline and 6 month after the periodontal therapy to assess the quality of life. **Results and Discussion:** We observed a rapid recurrence of the deep periodontal pockets after 12 months in subjects with poor glycaemic control. At baseline, the highest scores for the OHIP-14 were in the sub-domains of pain, discomfort on chewing and self-consciousness. **Conclusions:** The prolonged poor control of glycaemia is closely related with its complications. The periodontal therapy improved (lower values) the domain codes and final score of the OHIP-14 questionnaire, proving that periodontal health has an impact on the diabetic patients' quality of life.

Keywords: Diabetes Mellitus; Glycaemia Control; Quality of Life; Oral Health Education; Periodontal Status; Periodontal Therapy

Cornelia Oanta, Liliana Pasarin,
Irina Ursarescu, Alexandra Martu, Silvia Martu

“Gr.T.Popa”UMPh, Faculty of Dental Medicine,
Periodontology Department, Iasi, Romania

ORIGINAL PAPER (OP)

Balk J Dent Med, 2015; 19:167-170

Introduction

Diabetes mellitus (DM) is a metabolic disease characterized by high levels of glucose, which can be the result of a deficit in the insulin production, insufficient insulin action, or both. Hyper-glycaemia can be caused by a deficit in insulin production as a result of a beta pancreatic cells dysfunction and/or an insulin resistance in the liver or muscles. Diabetes has the potential of causing serious complications to the heart, eyes, kidneys, nervous and vascular systems, but fortunately there are strategies to control the disease and to reduce the risk of complications.

Insulin dependent diabetes mellitus (IDDM), previously known as juvenile onset diabetes, appears when the body's immune system destroys the beta pancreatic cells, the only body cells which produce insulin, which regulates the serum glucose levels¹. The type 1 DM is more frequent among children and young adults, although its onset can be at any age. Approximately 5% of DM cases are type 1²⁻⁴. The risk factors for this type of diabetes include autoimmune, genetic dysfunctions and environmental factors.

The diagnosis is based on 3 clinical assessments to identify the diabetes and/or risk levels. Only 1 modified value is not enough, the test has to be repeated in 2 consecutive days to confirm the diagnosis:

*Presented at the 20th Congress of the BaSS, Bucharest, 2015

- the symptoms which include polyuria, polydipsia and inexplicable weight loss, plus glucose values over 200 mg/dl⁵, no matter the period of time from the last meal;
- a serum glucose value ≥ 126 mg/dl after a fasting/ no caloric intake of at least 8 hours; normal values should be < 100 mg/dl;
- the values of glycated haemoglobin (HbA1c) $> 6\%$.

It is important to take into consideration a periodontal risk for diabetic patient as periodontitis is considered to be the sixth complication of the DM. The onset, progression and severity of the periodontal disease will be influenced by other factors besides diabetes, such as genetic, age, ethnicity, smoking, drugs, malnutrition, poor oral hygiene, inadequate dental restorations and hormonal variations.

Most of the diabetics' problems can be managed through prophylactic measures as oral health education, proper personal hygiene and regular visits to the dentist. Research has shown that mechanical periodontal therapy, with a goal to reduce the number of pathogen bacteria and control local inflammation, has a positive effect on the control of glycaemia⁵. Improvement of glycemic control in patients with poorly controlled DM results in the reduction of periodontal inflammation⁶. Thus the prevention and treatment of the established periodontal disease plays a very important role in glycemic control⁷.

Unfortunately most of diabetic patients are not aware of oral complications of the DM and the necessity of prophylactic attitude^{1,9}. So, it is possible that oral education and prophylaxis have a major impact on the diabetic patient's quality of life. The aim of this study was to assess quality of life of the diabetic patient, regarding his oral health, with the help of the OHIP-14 (oral health impact profile - 14).

Material and Method

This study comprised 21 persons with type 1 diabetes, males and females, all of them presenting a form of periodontitis. The excluding criteria were: type 2 DM, pregnancy, lactation or menopause, systemic diseases that were not a complication of DM, patients that have had a form of cancer, heavy smokers (more than 10 cigarettes a day), patients that have had periodontal treatment in the last 12 months or patients on antibiotic therapy in the last 2 months and the persons with less than 20 teeth remaining.

All the patients involved in this study were evaluated from a glycaemic and periodontal point of view. Furthermore, all the patients completed the OHIP-14 questionnaire before and after the periodontal treatment.

For each patient the glycated haemoglobin A1c (HbA1c) was determined using the method described by Cohen et al⁸. The importance of glycated haemoglobin

as a marker of glycaemic control for the diabetic patients was highlighted by two great studies - DCCT (Diabetes Control and Complications Trial) and UKPDS (United Kingdom Prospective Diabetes Study). These two have shown the favourable effect on the metabolic parameters (glycaemic index, HbA1c) and on the long term complications (micro and macro vascular)^{9,10}.

Periodontal evaluation consisted of determining the plaque index, calculus index, gingival bleeding, the depth of periodontal pockets and the clinical attachment level on the Ramfjord teeth (1.6, 2.1, 2.4, 3.6, 4.1, and 4.4). The periodontal probing was done in 6 points per tooth - 3 on the buccal surface (distal, central and mesial) and 3 on the oral surface (distal, central and mesial). All the clinical evaluations were done by the same person to minimize the errors that could occur during this stage. The information was then recorded in the periodontal chart of each patient.

Periodontal evaluation was done at the beginning of the study and 4 weeks, 6 months and 12 months after the initial periodontal (non-surgical) treatment. This treatment consisted in scaling and root planing (SRP), done in 2 stages over the course of 2 consecutive days (1 dental arch per day). The patient then used an oral rinse of 0.10% chlorhexidine and 0.50% clorbutanol (Eludril©), twice daily after brushing their teeth, for 2 weeks, starting with the first day of the mechanical periodontal therapy.

For the patients with poor glycaemic control, infection prophylaxis was conducted with the peroral use of 2 grams of Amoxicillin in a single dose, 1 hour before each stage of SRP. The OHIP-14 questionnaire had 14 questions focused on 7 impact directions: functional limitation, pain, psychological discomfort, physical disability, psychological disability, social disability and handicap.

For each of these questions, the patients have rated how often they had felt that way in the past 6 months, on a scale from 0 to 4, indicating if the problem was experienced "very often" (code 4), "fairly often" (code 3), "sometimes" (code 2), "rarely" (code 1) and "never" (code 0). The mean scores were calculated for each sub-domain, 4 being the maximum value, and for each patient a final score was calculated (the sum of all codes) 56 being the maximum. The final results were then divided into 3 categories: low impact (< 18.9), moderate impact (19-37.9) and high impact (38-56).

Results and Discussions

From the total number of participants, only 8 (38.09%) had been to a dentist's office in the past year. At baseline, the highest scores for the OHIP-14 were in the sub-domains of pain, discomfort on chewing and self-consciousness. The highest mean value was for the discomfort on chewing (Tab. 1). The handicap domain had no high impact code.

Table 1. Quality of life of diabetic patients at baseline

OHIP domains	OHIP sub-domains	No of low impact code 0-2	Percentage	No. of High impact codes 3-4	Percentage
Functional limitation	Words	17	80.9%	4	19.1%
	Taste	19	90.4%	2	9.6%
Physical pain	Pain	12	57.1%	9	42.9%
	Discomfort	10	47.6%	11	52.4%
Psychological discomfort	Consciousness	11	52.4%	10	47.6%
	Tense	13	61.9%	8	38.1%
Physical disability	Diet	13	61.9%	8	38.1%
	Interrupt	14	66.6%	7	33.4%
Psychological disability	Not relaxed	14	66.6%	7	33.4%
	Embarrassed	15	71.4%	6	28.6%
Social disability	Irritable	18	85.7%	3	14.3%
	Job	19	90.4%	2	9.6%
Handicap	Life	21	100%	0	0%
	Function	21	100%	0	0%

Table 2: Comparison of high impact codes at baseline and 6 months after periodontal therapy

OHIP domains	OHIP sub-domains	No of low impact code 0-2 at baseline		No. of High impact codes 3-4 at baseline		No of low impact code 0-2, 6 months after therapy		No of high impact code 3-4, 6 months after therapy	
		No of low impact code 0-2 at baseline	Percentage	No. of High impact codes 3-4 at baseline	Percentage	No of low impact code 0-2, 6 months after therapy	Percentage	No of high impact code 3-4, 6 months after therapy	Percentage
Physical pain	Pain	12	57.1%	9	42.9%	15	71.4%	6	28.6%
	Discomfort	10	47.6%	11	52.4%	14	66.6%	7	33.4%
Psychological discomfort	Consciousness	11	52.4%	10	47.6%	13	61.9%	8	38.1%
	Tense	13	61.9%	8	38.1%	15	71.4%	6	28.6%

Table 3: Comparison of periodontal pocket depth >4mm and bleeding on probing at baseline and 6 months after periodontal therapy for the patients with poor control diabetes mellitus

Periodontal Index	Percentage at baseline	Percentage at 6 months after periodontal therapy
Periodontal pocket depth >4mm	11,4%	13,4%
Bleeding on probing	50,1%	48,9%

6 months after the periodontal therapy, when the patients have taken the OHIP-14 questionnaire once again, all the domains/sub-domains with initial high impact codes had a decrease in values (Tab. 2).

From the periodontal point of view, for all the patients with poor glycaemic control (HbA1c>8%),

a rapid recurrence of periodontal pockets was noticed 12 months after the mechanical periodontal therapy, with a higher percentage than at baseline. Also, for the patients with poor glycaemic control, the bleeding on probing had a value at 12 months close to the one at base line (Table 3).

It can be concluded that a poor glycaemic control will negatively influence the patient's periodontal status and can decrease the results of the periodontal mechanical treatment.

Conclusions

1. It is essential to have a good collaboration between the diabetes physicians and the periodontal specialists so that the negative effect of DM on the patients' periodontal status can be minimized.

2. The periodontal therapy determined lower values in the domain codes and final scores of the OHIP-14 questionnaire proving that periodontal health has an impact on the diabetic patients' quality of life.

3. Considering the fact that this study is conducted on a limited number of patients, furthermore studies are required in order to gain more information over the impact of oral and periodontal health on the quality of life.

References

1. National Institutes of Health (NIH). Diagnosis of Diabetes: National Diabetes Information Clearinghouse. Publication No. 09-4642. October 2008. Accessed July 30, 2015.
2. American Diabetes Association. Diagnosis and classification of diabetes mellitus. *Diabetes Care*, 2005 Jan; 28(Suppl 1):S37-42.
3. American Diabetes Association. Diagnosis and classification of diabetes mellitus. *Diabetes Care*, 2006 Jan; 29(Suppl 1):S43-48.
4. Centers for Disease Control and Prevention, National Diabetes Statistics Report: Estimates of Diabetes and Its Burden in the United States, 2014, Atlanta, GA: U.S. Department of Health and Human Services; 2014. Accessed July 17, 2015.
5. Adler AI, Stratton IM, Neil HA, et al. Association of systolic blood pressure with macrovascular and microvascular complications of type 2 diabetes (UKPDS 36): prospective observational study. *BMJ*, 2000; 321:412-419.
6. Troy DB, Beringer PR. The Science and Practice of Pharmacy. "Prevention of Long-Term Complications." Lippincott Williams & Wilkins, 2005; Edition 21, pp 2234.
7. Barter P, Gotto AM, LaRosa JC, et al. HDL cholesterol, very low levels of LDL cholesterol, and cardiovascular events. *N Engl J Med*, 2007; 357(13):1301-1310.
8. Cohen MP, Witt J, Wu VY. Purified hemoglobin preparations in the evaluation of HbA1c determination by ion exchange chromatography. *Ann Clin Biochem*, 1993; 30:265-271.
9. Little RR, Rohlfing CL, Sacks DB. National Glycohemoglobin Standardization Program (NGSP) Steering Committee. Status of Hemoglobin A1c Measurement and Goals for Improvement: From Chaos to Order for Improving Diabetes Care. In *Clinical Chemistry*, 57:2, 205-214, 2011.
10. Martu A, Stefanache T, Pasarin L, Foia L, Martu S. Evaluation of glycemia at the level of sulcular and capillary blood in diabetic patients with periodontal disease. *Romanian Journal of Oral Rehabilitation*, 2013, 3(4):286-290.

Correspondence and request for offprints to:

Oanta Cornelia
 "Gr.T.Popa"UMPh
 Faculty of Dental Medicine, Periodontology Department
 Iași, Romania
 E-mail: cornelia_oanta@yahoo.com