THE INFLUENCE OF SCALING AND ROOT PLANING ON THE GLICEMIC STATUS IN PATIENTS WITH DIABETES MELLITUS TYPE II

Liliana Pasarin*, Irina Ursarescu-Sufaru, Ioana Mârțu, Sorina Solomon, Alexandra Martu-Stefanache, Arina Ciocan-Pendefunda, Silvia Martu

"Gr.T.Popa" U.M.Ph., Faculty of Dental Medicine, Periodontology Department, Iasi, Romania

***Corresponding author**: Pasarin Liliana: E-mail: liliana.pasarin@yahoo.com

ABSTRACT

The study proposes an assessment of the influence of the periodontal disease therapy by scaling and root planing on the glicemic status in patients with type II diabetes mellitus. Materials and method: The study was conducted on 21 patients with type I diabetes mellitus (study group) and 10 systemically healthy subjects (control group). We examined: the degree of glycemic control (by measuring the glycated hemoglobin), 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 planning. Results and discussion: The subjects with a poor glycemic control presented a higher percentage of sites with attachment loss, significantly higher amounts of bacterial plaque, sub-gingival calculus and gingival bleeding when compared with the control group or the subjects with good or moderated glycemic control. In the same group we observed a rapid recurrence of the deep periodontal pockets after 12 months. Conclusions: The prolonged poor control of the glycemia and the time elapsed from the debut of the diabetes were closely related with its complications. The comparisons between the diabetes and the control groups demonstrated that diabetes mellitus is a risk factor for the periodontal disease.

Keywords: *chronic periodontitis, scaling and root planing, type II diabetes mellitus, glycated hemoglobin.*

INTRODUCTION

Diabetes mellitus (DM) is a metabolic disease characterized by hyperglycemia caused by inadequate insulin secretion and/or low tissue response to insulin (1). Symptoms of diabetes mellitus consist in polyuria, polydipsia, weight loss, blurred vision and, sometimes, polyfagia. The majority of diabetes cases can be divided into two etiopathogenic categories: type 1 diabetes (insulin dependent) and type 2 (non insulin dependent). For the type 1 diabetes mellitus, the cause is a deficiency of insulin secretion.

On the other hand, periodontal diseases are among the most common infectious and inflammatory diseases in the world (2). Evidence has revealed that diabetes is a risk factor for increased severity of gingivitis and periodontitis and that also, periodontitis is a risk factor for worsening glycemic control in patients with diabetes, and may increase the risk for diabetic complications (2).

DM is associated with numerous systemic complications (3) (cardiovascular, nervous, renal, ophthalmic, dermatologic), and periodontitis is considered to be its sixth complication. Numerous studies have shown a bidirectional relationship between DM and periodontitis, proving the importance of the diabetes screening among the patients with periodontitis (4).

Thorough researches on different populations have shown that there is a higher prevalence of periodontitis among the

patients with type 2 DM (5-10). Furthermore, it is known that the time elapsed from the debut of the DM has a notable effect on the severity of the periodontitis. Cedra (11) and Khader (12) have shown that diabetes evolving for more than 5 years is correlated with increased periodontal tissue destruction.

MATERIALS AND METHOD

This study was conducted on 31 subjects of which 21 patients with type 1 diabetes mellitus (study group) and 10 clinically healthy patients (control group). All the patients presented a form of periodontitis. Males (n=17) and females (n=14) were included in this study in order to obtain a homogeneous final result. The following patients were excluded from the study: the ones with type two DM, pregnant, lactating or menopause women, patients with systemic diseases that were not a complication of diabetes mellitus, patients that have had a form of cancer, heavy smokers (more than 10 cigarettes a day), the patients that have had periodontal treatment in the last 12 months or antibiotherapy in the last 2 months and the patients with less than 20 teeth remaining. All the patients involved in this study were evaluated from a glycemic and periodontal point of view.

For each patient was determined the glycated hemoglobin A1c (HbA1c) using the method described by Cohen and collab (13). The importance of glycated hemoglobin as a marker of glycemic control for the diabetic patients was highlighted by two great studies - DCCT (Diabetes Control and Complications Trial) and UKPBS (United Kingdom Prospective Diabetes Study). These two have shown the favourable effect on the metabolic parameters (glycemic index, HbA1c) and on the long term complications (micro and macro vascular) (14).

The control group had an HbA1c value of 4-6%, while the diabetes patients were divided into two sub groups: DM1 - good and moderated glycemic control, with HbA1c $\leq$ 8% and DM2 - poor glycemic control, with HbA1c > 8%.

The periodontal evaluation consisted in 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 others 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.

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

For the patients with poor glycemic control, infection prophylaxis was conducted with the use of 2 grams Amoxicillin per os in a single dose, one hour before each stage of SRP.

RESULTS AND DISCUSSIONS

Even from the first evaluation it was noticed that the patients in the poor glycemic control group (DM2) had a plaque index,

calculus index and bleeding on probing index significantly higher than the ones in the good and moderate glycemic control group (DM1) and the ones in the control group (C). After the SRP was conducted, the patients were re-evaluated at 4 weeks, 6 and 12 months. Although a slight reduction of bleeding on probing was noticed at 4 weeks and at 6 months for all 3 groups, at the 12 months re-evaluation the bleeding on probing had a value close to the one recorded at the beginning of the study for the DM2 group (Table1). These results are consistent with other studies that have shown a correlation between poor glycemic control (HbA1c > 7%) and a high bleeding index (15-20).

Table 1. The evaluation of response to treatment – bleeding on probing

Study group	Baseline Evaluation	4 weeks evaluation	6 months evaluation	12 months evaluation
C (control)	27.4%	19.4%	20.9%	22.8%
DM1 (good or moderate glycemic control)	28.1%	19.9%	21.3%	23.1%
DM2 (poor glycemic control)	50.1%	37.7%	42.7%	48.9%

Table 2. The evaluation of response to treatment – periodontal pocket depth >4mm.

Study group	Baseline Evaluation	4 weeks evaluation	6 months evaluation	12 months evaluation
C (control)	5.3%	4.9%	3.2%	3.3%
DM1 (good or moderate glycemic control)	6.1%	5.8%	4.7%	4.9%
DM2 (poor glycemic control)	11.4%	10.6%	11.2%	13.4%

Regarding the percentage of periodontal pockets deeper than 4 mm a significant modification was not noticed for either of the groups at the four weeks re-evaluation. It is possible that this time frame is too short in order to truly evaluate the effects of the mechanical periodontal therapy (SRP) on the periodontal pockets depth.

For the control and DM1 groups, significant improvement of this clinical parameter (periodontal pockets depth) was noticed at the six months re-evaluation which was maintained until the 12 months examination. For the DM2 group, the patients with poor glycemic control, rapid recurrence of periodontal pockets was observed, with a higher percentage than before treatment (Table 2). It can be concluded that a poor glycemic control will negatively influence the patient's periodontal status and can decrease the results of the periodontal mechanical treatment.

Considering the fact that every infection triggers an insulin resistance and the necessity for increasing the insulin doses of the diabetic patient, a precocious diagnosis and efficient treatment of these patients'

periodontitis is vital in order to facilitate the glycemic control and prevent the diabetic complications as much as possible. For this reason 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.

CONCLUSIONS

The comparisons between the diabetic patients and the control group patients have proved that DM is a risk factor for periodontal disease. A poor long term control of glucose levels and the time elapsed from the debut of the diabetes are tightly linked with the diabetic complications. Considering the fact that this study is conducted on a limited number of patients further studies are required to better understand this double way/bilateral relationship between the periodontal diseases and the diabetes mellitus.

REFERENCES

1. American Diabetes Association. Diagnosis and Classification of Diabetes Mellitus. Position Statement, Diabetes Care, 2014.37, Suppl.1.
2. Brian L. Mealey, Louis F. Rose. Diabetes mellitus and inflammatory periodontal diseases. Endocrinology, Diabetes & Obesity 2008, 15:135-141.
3. Pickup J, Williams G. The history of diabetes mellitus. The textbook of diabetes mellitus, Oxford: Blackwell 1997:1.1-1.19.
4. Taylor GW. Bidirectional inter-relationship between diabetes and periodontal diseases: an epidemiologic prospective. Ann periodontal 2001;1:99-112.
5. Jyotika KF, Ryan EW, Carlos FS, Sara GG, John JS, Maria FLV, Elizabeth H. Slate Periodontal Disease Status in Gullah African Americans with Type 2 Diabetes Living in South Carolina. J Periodontal 2009;80:1062-68.
6. Novak MJ, Potter RM, Blodgett J,Ebersole JL. Periodontal Disease in Hispanic Americans with Type 2 Diabetes, J Periodontal 2008;79:629-36.
7. Mattout C, Bourgeois D, Bouchard P. Type 2 Diabetes and Periodontal Indicators: Epidemiology in France 2002-2003. Journal of Periodontal Research 2006;41:253-58.
8. Aline MS, Andrea MDV. Efigenia FF, Mauro HNGA, Periodonitis in Individuals with Diabetes Treated in the Public Health System of Belo Horizonte, Brazil. Rev Bras Epidemiol 2010;13:118-25.
9. Preshaw PM, De Silva N, McCracken GI, Fernando DJS, Dalton CF, Steen ND, Heasman PA. Compromised Periodontal Status in an Urban Sri Lankan Population with Type 2 Diabetes. J Clin Periodontal 2010;37:165-171.
10. Mansour AA. Abd-Al-Sada N. Periodontal Disease among Diabetics in Iraq. Med Gen Med.2005;7:2
11. Cedra J, Vazquez de la Torre C, Malacara JM, Nava LE. Periodontal disease in non-insulin dependent diabetes mellitus (NIDDM). The effect of age and time since diagnosis. J Periodontol 1994; 65, 991-95.
12. Khader YS, Albashaireh ZS, Hammad MM. Periodontal Status of Type 2 Diabetics Compared with Nondiabetic in Norh Jordan. East Mediterr Health J 200:14:654-61.
13. Cohen MP, Witt J, Wu VY. Purified hemoglobin preparations in the evaluation of HbA1c determination by ion exchange chromatography.Ann Clin Biochem 1993;30:265–71.
14. Randie R. Little, Curt L. Rohlfing, David B. Sacks, 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, 2011,57(2):205-214,
15. Foia L, Toma V, Surlin P. Diabetes Mellitus Impact on Periodontal Status in Children and Adolescents in Periodontal Diseases - A Clinician's Guide, Edited by Jane Manakil, ISBN 978-953-307-818-2, 380 pages, 2012, Publisher: InTech.

16. Borgnakke WS, Ylostalo PV, Taylor GW, Genco RJ. Effect of periodontal disease on diabetes: systematic review of epidemiologic observational evidence. J Periodontol 2013; 84 (4 Sullp.): S135-S152 doi; 10.1902/jop.2013.1340013
17. Pinar Gumus, Nurcan Buduneli. Diabetes Mellitus and periodontitis: signs of a bidirectional relationship. European Medical Journal Diabet. 2013; 1:30-36;
18. Potarnichie Oana, Arbune Manuela, Ursarescu Irina, Martu Silvia. Statistical study on diabetes mellitus incidence in periodontally affected patients.. Romanian Journal of Oral Rehabilitation 2013, 5(1), 10-14.
19. Macovei-Surdu Amelia, Rudnic Ioana, Martu Ioana, Solomon Sorina, Pasarin Liliana, Martu Silvia. Studies regarding the bidirectional relationship between the periodontal disease and hyperlipidaemia. Romanian Journal of Oral Rehabilitation 2013, 5(1), 76-81.
20. Marțu Maria Aalexandra, Stefanache T, Pasarin Liliana, Foia Liliana, Martu Silvia. 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.