Original Paper

Odontal-Periodontal Changes in Patients with Type 1 Diabetes

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ABSTRACT: Diabetes mellitus is a complex disease characterized by insufficient insulin secretion and / or an inefficiency of target tissues to its metabolic action. Periodontal disease was recognized as the sixth leading complication of a diabetes. Gingival sulcus bleeding is considered as an important clinical parameter in the diagnosis of periodontal disease. This research is based on comparison of the clinical and paraclinical data between groups of patients with type 1 diabetes and periodontal disease on the one hand and groups of patients with periodontal disease without diabetic disease on the other hand. We can conclude that there is sufficient data to confirm the existence of a bidirectional relationship between metabolic changes in type 1 diabetes and periodontal (odontal-periodontal) disorder of patients, especially in adolescents and young adults. Both diseases can influence each other more or less, so for diabetics there is a predilection to develop periodontal disease as diabetes is a risk factor for severe parodontopathies.

KEYWORDS: *diabetes mellitus, periodontal disease, odontal-periodontal lesions*

Introduction

Diabetes mellitus is a complex disease characterized by insufficient insulin secretion and/or an inefficiency of target tissues to its metabolic action [1]. Diabetics are more prone to be periodontally compromised and have atypical patterns of refined carbohydrate ingestion [2]. Oral health of diabetic patients was the subject of a lot of studies over the years. While these patients are recognized to have increased sensitivity to periodontal disease disease [3], the probability of detecting an increase the prevalence of dental caries in patients with type 1 diabetes is more controversial [4].

The main complications of diabetes is that it affects organs and tissues rich in capillaries vessels such as kidney, retina and nerves, these complications being secondary developments following microangiopathy. Similar changes in small vessels can be found in the oral tissues. Periodontal disease was also recognized as the sixth leading complication of diabetes. All these long-term consequences have been extensively studied in recent years, and this has led to improved disease prevention and effective therapy, thus providing the patients with diabetes a better quality of life [5]. The metabolic imbalances in tissues can reduce the resistance of diabetics infection and thus influence initiation, development and progression of periodontal disease reports on the relationship between teeth and diabetic disease of young diabetics is scarce the results were variable [6].

Gingival sulcus bleeding is considered as an important clinical parameter in the diagnosis of periodontal disease. Despite the many diagnostic advances, gingival bleeding during probing is more sensitive and an early clinical indication of early gingival pathology. Several studies have shown that probing bleeding is a positive predictor, but on the contrary, lack of bleeding is a very strong negative predictor. Continuing the absence of bleeding at the sounding is considered a strong predictor of continued periodontal health [7]. Gingival bleeding has a positive correlation with the accumulation of plaque and calculus [8].

The aim of study is to establish correlations between variate parameters and highlight features disturbance of carbohydrate metabolism and the main forms of periodontal disease on the one hand and, on the other hand, to establish correlations between dental status of patients with type 1 diabetes.

Material and method

The study was approved by the Committee of Ethics and Academic and Scientific Deontology of the University of Medicine and Pharmacy of Craiova. Participation to this study was voluntary and all participants, for children, their parents/legal guardians, provided a written informed consent.

The study was conducted on two groups of patients, the subjects with type 1 diabetes and

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odontal-periodontal changes and a second group of patients with an odontal-periodontal diagnosis in the absence of diabetes. The criteria for study inclusion were: the presence of type 1 diabetes for at least 6 months and the presence of odontal/periodontal lesions. From the groups we studied, we excluded patients whose data was inaccessible, incomplete or disagreed with their participation in the study.

The first group (test) studied consisted of 22 patients, aged between 5 and 29 years, diagnosed with type 1 diabetes and guided for a dental examination after odontal-periodontal changes noticed both prescriber and patient. The test group was initially divided into two subgroups according to the age of each patient: one for children (C1) (10 patients) and one for adults (A1) (12 patients).

For the control group we examined a total of 32 patients, aged between 7 and 28 years, who had odontal-periodontal manifestations, but who did not have diabetes. Control group was divided into: control group for children (C2) (14 patients) and adult control group (A2) (18 patients). Were recorded clinical data of diabetes: type 1 diabetes diagnosis age, age of onset of disease, and glycated haemoglobin test (HbA1c) values.

Findings and periodontal dental status was achieved by a general clinical examination, laboratory investigations local. All patients in these groups were clinically examined and we also used paraclinical investigation Silness and Loe plaque index and bleeding on probing index. Bleeding and plaque indices were assessed by single examiners, at six sites per tooth. We have noted that the number of teeth presented pockets exceeding 6mm, which is an indicator for determining the extent of disease. The odontal examinations determined that the test group of children had four patients with temporal dentition, 3 patients had mixed dentition and 3 patients had permanent dentition. The frequency of incipient caries (CI) was higher in temporary dentition, unlike the advanced destructive forms (coronary destructions-CD, with evidence of root residues) were more frequent in permanent dentition. Statistical analysis was performed using an analysis of variance (ANOVA) test with significant results being considered for p values inferior to 0.05.

Results

Analysis of the type of odontal lesions showed CI in all patients examined, and DC to 7 of the 10 patients examined. In addition to the two forms of dental injuries (CI and DC), we found complicated cavities 5 of the 10 patients examined. Odontal examination of group control children showed the presence of temporary teeth in 1 patient, the mixed dentition to permanent dentition 6 patients and in 7 patients. Most dental injuries were the type CI and most often in deciduous and mixed (Fig.1).

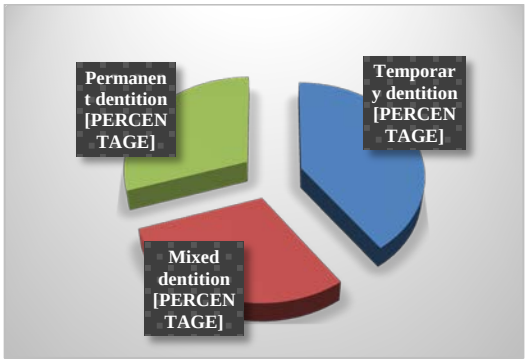

Fig.1. Dentition of the patients

CC type dental injuries we found in 5 patients out of 12 examined, DC in 7 patients from control group children. Of the 10 patients, all children (C1 group) diagnosed with type 1 diabetes and a form of periodontal disease, none had been diagnosed with periodontitis, all of being diagnosed with gingivitis. Apart from the two forms of odontal lesions (CI and DC), we found complicated caries in 5 patients of the 10 examinations (Table1).

Table 1. Results of the odontal examination at C1

Dentition	CI	CC	DC
T	2	0	2
T	4	0	3
T	3	0	1
M	1	0	2
M	2	1	1
P	2	2	0
T	2	0	4
M	2	1	1
P	4	1	0
P	3	1	0

(T=temporary dentition/M=mixed dentition/P=permanent dentition)

Most odontal injuries were CI and most in temporary and mixed teeth. Odontal lesions like CC were found in 5 patients of the 14 examined, and DC in 7 patients from the C2 group (Table 2).

Table 2. Results of the odontal examination at C2

Dentition	CI	CC	DC
T	1	1	2
M	2	1	1
M	1	2	2
M	1	0	1
M	0	1	0
P	0	0	0
P	2	0	0
P	1	0	1
M	2	1	1
M	2	1	0
P	1	2	1
P	1	1	0
P	1	0	0
P	2	1	1

(T=temporary dentition/M=mixed dentition/P=permanent dentition)

Odontal examination of A1 group showed the presence of lesions CI and CC in bigger numbers than in the A2 group (Tables 3,4).

Table. 3. Results of the odontal examination at A1 group (F=female/M=male)

Gender	CI	CC	DC
F	2	1	0
F	2	1	1
F	1	1	1
F	1	0	0
F	2	0	0
F	1	1	0
F	1	1	0
F	2	2	1
M	1	1	0
M	1	0	0
M	1	0	1
M	2	1	1

Table 4. Results of the odontal exam at A2 group (F=female/M=male)

Gender	CI	CC	DC
F	1	0	0
F	1	0	1
F	1	0	0
F	1	0	0
F	0	1	0
F	1	1	0
F	0	1	0
F	1	1	0
F	1	0	0
F	1	0	1
F	0	1	1
M	0	1	0
M	1	1	0
M	1	0	0
M	0	1	0
M	2	0	0
M	2	1	0
M	1	1	0

We compared odontal lesions in both groups and we found that patients in the test group with type 1 diabetes had presented several CI, CC and/or DC, unlike patients in the control group, which may have a connection with the diagnosis of diabetes. More than 70% from the C1 group presented DC lesions, the percentage for C2 group being of 57%.

Plaque index in test group of adults with diabetes and periodontal disease is higher than the control group index calculated for adults. Plaque index in control group of adults is lower than those found in the control group children, $p<0.05$ (Fig.2).

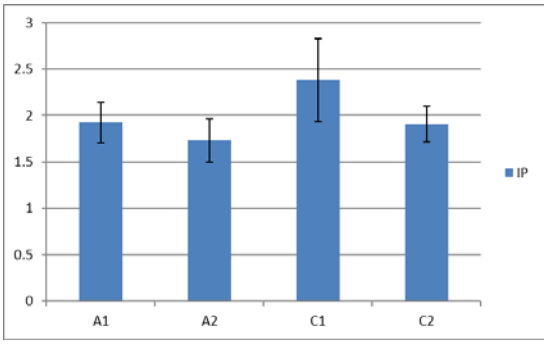

Fig.2. Plaque index. (A1=adults test group, A2=adults control group, C1=children test group, C2=children control group)

Bleeding on probing and the gingival index have been used to clinically characterize the degree of gingival inflammation. At a site level, the correlation coefficients of plaque and bleeding on pocket probing were 0.20. The average percentage of sites per person with bleeding at marginal probing, bleeding in pocket and dental plaque was of 58,2% for C1, 31.1% for A1, 32.8% for C2 and 18.7% for A2 (Fig.3).

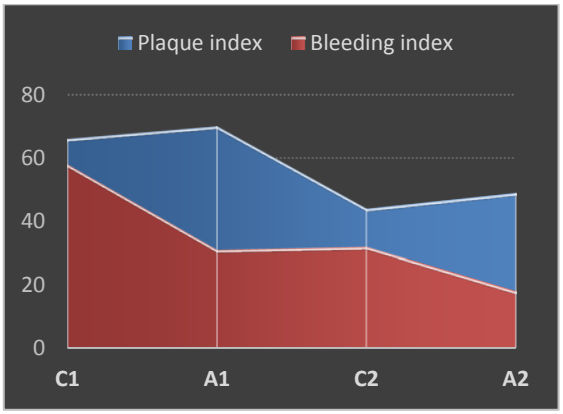

Fig.3. Periodontal index. (A1=adults test group, A2=adults control group, C1=children test group, C2=children control group)

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From the group of 12 adults (A1 group), gingivitis showed approximately 33.34%, while 66.66% of those examined showed some form of periodontitis. All 14 children in the control group (without type 1 diabetes) had gingivitis. From control group of adults (18 in number) only 4 patients received a diagnosis of periodontitis, all other (14 patients) were diagnosed with gingivitis More than half of the group of patients (52%) with diabetes and periodontal disease indicated that feel painful embarrassment during brushing, which makes them avoid cleaning the oral cavity, favoring the accumulation of plaque and Silness and Loe index higher.

Generally, male subjects showed a more dental statistical plaque and a more gingival inflammation than female subjects. Clinical signs of gingival inflammation were found in all subjects examined. Gingival damage around permanent teeth was directly related to the amount of dental plaque deposits and the presence of bleeding during the probing. Considering the results of the study, we found that the group with type 1 diabetes, especially the children group, had odontal and periodontal lesions more than the group of diabetics without type 1 diabetes.

Discussion

Our study found a new finding on a higher rate of cavity for children with diabetes. Other studies of diabetic children did not report any difference in caries risk, although a recent study of diabetic adults by Svensson and Joshipura [9] found a difference in caries risk and rates for diabetic patients compared to of non-diabetic patients.

This can be explained by the presence of xerostomia or decreased salivary flow caused by diabetes and the absence of preventive and regular dental care in diabetic children. Also, according to other studies, diabetes mellitus may be a risk factor for caries due to increased glycaemia in saliva and elevated blood glucose in gingival cervical fluid [10]. This study, by its results, coincides with that of previous studies on diabetes patients, which showed that diabetics pose a greater risk for periodontal disease. Type 1 diabetes participants showed increased signs of gingival inflammation, as well as higher levels of bleeding at the sounding.

The results of dental caries studies are brief. Dental caries are a multifactorial disease and, while certain factors increase the risk of caries disease in type 1 diabetes, others reduce it [11]. Tooth decay risk factors include oral cariogenic bacteria, fermentable carbohydrate consumption as a substrate for cariogenic bacteria, and enough time for caries to form. Factors of cervical protection include saliva, oral hygiene and fluoride [12].

Insignificant differences in the incidence of dental caries between healthy and diabetic children were observed in a large study by Lalla et al. [13] and in several recent studies in Brazil, Egypt and Belgium, where study groups consisted of about 50 diabetic children [14,15].

It was suggested by some authors that salivary secretion rates may be significantly reduced in children with Type 1 Diabetes Mellitus when compared to healthy children [16].

Many authors have investigated oral complications of type 1 diabetes is difficult to establish comparisons of studies due to the high diversity of the patient the selection criteria and the design of the studies involved. In our present we compared two groups of young people - control group with type 1 diabetics and second group without diabetic disease in the absence of concomitant diseases.

The combination of general medical assessment and non-invasive gum tests, recent studies have shown bi-directional interrelationships between periodontal disease and systemic disorders, including metabolic syndrome, diabetes and obesity [17].

Diabetes generally has a higher prevalence of periodontal disease than for the healthy population-with a clear relationship between diabetes and various clinical conditions periodontal parameters-although reported by other authors there is no such relationship between periodontal disease and diabetes [18].

The association between BOP, an important sign of clinical inflammation and periodontal destruction, was studied [19]. Although a direct association has been demonstrated, it has also been demonstrated that a high percentage of sites with gingival inflammation and/or computation could not develop attachment loss [20].

The presence of gingival bleeding, irrespective of the depth of the samples, is globally accepted as an early objective target of periodontal disease. This reasoning is supported by immune inflammatory changes in the progression of periodontal disease [21], which states that bacterial plaque and tartar cause an inflammatory immune response that eventually

releases cytokines that in turn mediate hyperemic events.

A very important aspect of this research is the comparison of the clinical and paraclinical aspects between groups of patients with type 1 diabetes and periodontal disease on the one hand and groups of patients with periodontal disease without diabetic disease on the other hand.

The most recent studies tend to focus on research into the possible direct and indirect influence of type 1 diabetes on oral health and vice versa, but their results are unclear in most aspects. Thus, the relationships between different oral diseases and their causal factors and type 1 diabetes should become a subject of intensive research in the future.

Conclusion

Thus, we can conclude that there is sufficient data to confirm the existence of a bidirectional relationship between metabolic changes in type 1 diabetes and periodontal (odontal-periodontal) disorder of patients, especially in adolescents and young adults. Both diseases can influence each other more or less, so for diabetics there is a predilection to develop periodontal disease as diabetes is a risk factor for severe parodontopathies.

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