Original Study

EVALUATING THE EFFECT OF TYPE I DIABETICS ON THE PREVALENCE OF PERIODONTAL DISEASES IN CHILDREN

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ABSTRACT

Aim: The most common oral finding in diabetic patients are periodontal diseases and inflammatory changes in the gum. The present study is conducted with aim of evaluating the oral hygiene, determining the prevalence of periodontal diseases in children with type 1 diabetes and comparing them with healthy homogeneous children.

Materials & Method: This study was conducted as an observational and cross-sectional study. The subjects were selected through simple sampling and into two groups of case and control. The case group consisted of 100 children with type 1 diabetes in the age range of 7 to 20 years old, who were all covered by the Tehran Diabetes Research Center. The control group consisted of 65 healthy children referring to one of the dental centers of Tehran province that were in the same age range. It was also attempted so gender and social class be as similar as possible. Data collection was done using questionnaires, medical records and clinical examinations. OHI-S and GI indexes were determined in each patient, and finally, the data was analyzed by statistical tests of one-way ANOVA, t and Pearson correlation.

Results: The mean OHI-S index in the healthy group was 1.86 ± 0.62 and in the diabetic group was 1.56 ± 0.59. The mean PI index in the healthy group was 1.02 ± 0.52 and in the diabetic group was 1.57 ± 0.84. The mean GI index in the healthy group was 0.64 ± 0.57 and in the diabetic group was 1.95 ± 0.53.

Conclusion: Although the level of oral hygiene in children with type 1 diabetes was similar to that of healthy children, however, the prevalence of gingivitis and periodontal disease in children with type 1 diabetes is higher than that of healthy peers. Therefore, programs for the prevention of periodontal diseases should be considered in diabetic young patients.

Key words: Oral hygiene, Periodontal diseases, Type 1 Diabetes.

Introduction

Diabetes is the most commonly diagnosed metabolic disorder that is caused by absolute or relative insulin deficiency and decreased insulin secretion from the pancreas or insensitivity to insulin of the peripheral tissue receptors. This disease is considered as one of the most important health care and socio-economic problems in the world.[1]

Evidence suggests that the presence of chronic bacterial infection from periodontal diseases can have a negative impact on metabolic control of the disease. Periodontitis is known as the sixth major problem of diabetic patients.[2] Therefore, the need to examine the possible relationship between diabetes and periodontal diseases is felt. Lalla *et al.* (2006) have mentioned that plaque accumulation and the incidence of periodontal disease in people aged 6 to 18 years old with diabetes is more than healthy people.[3] Campus *et al.* have also found that most of diabetic people have more susceptibility to periodontal diseases,[4] and other researchers have confirmed their results,[5-8] while other researchers have rejected such a relationship.[9-12]

Therefore, considering the contradictions in the articles and the lack of knowledge about oral hygiene status and the prevalence of periodontal diseases in diabetic patients, this study was designed in the province of Tehran. The purpose of this study was to evaluate the prevalence of periodontal diseases and oral hygiene status in children with type 1 diabetes who were referred to the Tehran Diabetes Research Center in order to compare them with non-diabetic healthy children who are similar in other respects.

Materials and Methods

In this study, 82 patients with type 1 diabetes, including 50 girls and 30 boys and 75 healthy individuals, including 39 girls and 42 boys aged 7 to 20 years old, were examined and evaluated. Seventy Four diabetic patients (case group) were all patients who were covered by Tehran Diabetes Research Center, and the control group was selected from patients referred to the orthodontics department of one of the dental centers of Tehran. All the subjects in the control group had no diabetes, they were not aware of their dental problem, they were not subjected to orthodontic treatment, and their purpose of referring to the college was only to consult about whether they need orthodontic treatment.

It should be noted that it was initially decided that the control group should be selected from sisters and brothers in the case group, but this was not possible due to lack of cooperation of families. Therefore, the experience of a group of other researchers was used, so that the control group was selected from those referring to different departments of the dental school.[13-14] In this study, questionnaires, medical records and clinical oral examinations were used for data collection. The patient's personal information included in the questionnaire form was asked directly from the patients, and information such as the age of catching type 1 diabetes and duration of treatment, and also mean FBS of tests performed over the past year were obtained from their medical records in the Diabetes Research Center.

The examination and the questionnaire form was prepared in two parts, the first part contained a series of personal information that was completed in collaboration with the

patient or his/her parents. The second part of the form included oral hygiene status and periodontal health status, these examinations were performed using a flat dental mirror no. 22, catheter no. 23, Williams periodontal probe, and sterilized gas for cleaning the tip of Catheter under the unit light. The indexes used included the Simplified Oral Hygiene Index (OHI-S), the Periodontal Index, and the Gingival Index (GI).

In order to determine the mean of fasting blood sugar tests (FBS) of patients, their medical records in Tehran Diabetes Research Center were used and the mean of the corresponding values during the past year was obtained. Individuals whose mean FBS test was ≤130 mg/dL were placed in the good metabolic control group, those with a mean FBS from 120 to 200 mg/dL were placed in the moderate metabolic control group, and those with a mean FBS of more than 200 mg/dL were placed in the weak metabolic control group.[9]

In this study, one-way ANOVA, two-factor analysis of variance, t-test and Pearson correlation were used. In all tests, a significant level of 0.05 was considered.

Results

In this study 74 children with type 1 diabetes and 65 healthy children with an average age of 12.1 ± 3.31 were examined and the following results were obtained:

The oral hygiene status and periodontal tissue health were compared in two groups. The difference between the DI-S, CL-S and OHI-S indexes in the two groups was not statistically significant, however, there was a significant difference between the PI and GI indexes in the two groups. [Table 1]

Index \ Group	Mean ± SD of Healthy Subjects	Mean ± SD of Diabetes Subjects	Test Results (t)
DI-S	0.95 ± 0.35	1.47 ± 0.51	p = 0.82; t = 0.34
CL-S	0.21 ± 0.53	0.52 ± 0.20	p = 0.42; t = 0.94
OHI-S	1.63 ± 0.51	1.23 ± 0.59	p = 0.54; t = 0.72
PI	0.64 ± 0.67	1.27 ± 0.85	p = 0.001; t = 6.22.
PG	0.84 ± 0.75	1.37 ± 0.57	p = 0.00; t = 6.01

Table 1: Comparison of mean DI-S, CL-S, OHI-S, PI and GI in the two groups.

By performing multivariate analysis of variance, the same results were also obtained.

The control of diabetes had no significant relationship with PI and GI indexes, but its relationship with DI-S, CL-S, OHI-S indexes was significant. [Table 2]

Index \ Diabetes Control	DI-S Mean + SD	CI-S Mean + SD	OHII-S Mean + SD	PI Mean + SD	GI Mean + SD
Good	1 42 + 0 32	0 089 + 0 21	1 52 + 0 59	1 34 + 0 78	1 25 + 0 48
Medium	1 21 + 0 22	0 28 + 0 76	1 24 + 0 47	1 21 + 0 65	1 74 + 0 44
Weak	1 74 + 0 74	0 19 + 0 82	1 94 + 0 5	1 74 + 1 16	1 45 + 0 29
Total	1 47 + 0 91	0 95 + 0 2	1 56 + 0 99	1 42 + 0 85	1 2 + 0 45
Anova Test Result	p = 0 01	p = 0 03	p = 0 005	p = 0 39	p = 0 47

Table 2: Comparison of mean DI-S, CI-S, OHI-S, PI and GI in terms of disease control status.

Pearson correlation test was performed on this relationship, and similar results were obtained, except that the DI-S index did not have a significant relationship with disease control (p = 0.10, r = 0.991). There was a statistically significant difference between mean GI in the two groups with OHI-S index control. [p = 0.001] [Table 3]

There was a statistically significant difference between mean GI in the two groups with OHI-S index control (p = 0.001). [Table 3]

	GI	
Groups OHI-S	Healthy Mean ± SD	Diabetes Patients Mean ± SD
Good	0 56 ± 0 48	1 02 ± 0 63
Medium	0 93 ± 0 32	1 32 ± 0 92
Weak	1 74 ± 0 01	1 85 ± 0 92
Total	0 82 ± 0 68	1 23 ± 0 31
The result of the two-factor Anova test was p = 0.001		

Table 3: Comparison of mean GI in two groups of diabetic and healthy in terms of OHI-S index.

Discussion

This study showed that the level of debris accumulation, plaque formation, and oral hygiene status in healthy children are almost the same and there is no significant difference. These findings are consistent with the results of other studies.[15-17] Although, in the studies by Goteiner (1986), on 169 diabetic children aged 5 to 18 years old, and by Stomatogija,[18] in 2005 studied on 70 diabetic children aged 10 to 15 years old, they estimated that the plaque formation rate in diabetic group is higher than healthy group.

It was also determined that the control of diabetes is effective on the levels of debris accumulation, plaque formation and oral hygiene status, [Table 2] so that in the group with poor control of the disease, debris accumulation and plaque formation were much higher than those with good control of the disease, and oral hygiene level in this group was much lower that other two groups (p = 0.005). Similar results were obtained using Pearson correlation test, except that the DI-S index had no significant relationship with control of the disease. In the study by Kneckt *et al.*,[18] (2000) they concluded that there are common psychological factors between oral hygiene metabolic control of diabetes, and those with good control of the diabetes have a better oral hygiene status compared to group with weak control.

In the present study, the prevalence of periodontal diseases in the diabetic group was significantly higher than that of healthy peers (p = 0.000). Other similar studies conducted using the periodontal index also confirm the increase of periodontitis in type 1 diabetic patients.[19-20] The reason for this has been cited due to reduced function of neutrophils in diabetic patients compared to healthy individuals.[20] Another group of researchers has also reported a positive relationship between type 1 diabetes and the loss of epithelial adhesion.[3,5,6,21] The severity of periodontal disease in diabetic patients was also higher than healthy individuals.[3,4] Contrary to these results, many researchers

have also rejected the prevalence of periodontitis and periodontal diseases in patients with type 1 diabetes compared to healthy people.[13-16,22-24] Finally, the reason for these contradictions are differences in the study sample, as well as differences in the method of research and analysis of the findings. Differences in the age of subjects, status of control of their disease, gender, and race are among the differences in the study sample. The difference between the indexes used in the research, the number of samples, the error of examiner and the statistical methods used to analyze the data are of differences of study method and analysis.

The prevalence of periodontal disease had no significant relationship with metabolic control of type 1 diabetes. Although, this prevalence in patients with poor metabolic control was higher than two other groups. In the study by Albrecht,[25] (1988), he cited that there is no significant relationship between the prevalence of periodontitis, mean periodontal index (PI), and blood glucose levels. In the study by Karjalainen *et al*.[2] (1994), there was no difference in the prevalence and severity of periodontal disease in different subgroups of patients with type 1 diabetes with various metabolic controls. However, a number of researchers have found that the control of diabetes is effective on periodontal status.[7,26]

Based on the findings of this study, the prevalence of gingivitis in the group with type 1 diabetes was significantly higher than healthy group (p = 0.000). This result is consistent with the results of other studies.[3-5] However, other researchers in separate studies have rejected the relationship between gingivitis and diabetes.[12-13,27] The reason for the contradictions between the results of various studies, as in the case of periodontal status, can be attributed to the difference in the study sample and also the difference in the research method and the analysis. According to this study, control of diabetes had no significant impact on the prevalence of gingivitis, which was consistent with the results of other studies by Jones RB *et al*.,[28] Albrecht *et al*.[25] and Moore PA *et al*.[29]. On the other hand, several researchers[7,14] concluded in the similar studies that there is a significant relationship between disease control and gingivitis, so that the prevalence of gingivitis was lower in patients with better metabolic control.

Conclusion

Despite the similarity between oral hygiene levels in children with type 1 diabetes and healthy children, the prevalence of gingivitis and periodontal diseases in children with type 1 diabetes was higher than healthy peers. Therefore, policymaking for programs of preventing periodontal diseases seems to be necessary in young diabetic patients.

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