Original Article

MedInform

DOI: 10.18044/Medinform.201631.398

ISSUE 1, 2016

Oral Health in Bulgarian Children with Diabetes Mellitus

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Abstract

Introduction: Diabetes mellitus (DM) is a disorder characterized by high glucose levels and metabolism abnormalities in processing carbohydrates, fats and proteins (2). Diabetes is a life-long disease. Studies show more oral complications among diabetics compared to non-diabetic individuals matched by age and sex. A crucial factor in examining oral pathology is the glycemic control of patients. Accordingly, different oral complications may be revealed.

Objectives: To examine and summarize the prevalence, symptoms and signs of oral manifestation of DM type 1 in a sample group of Bulgarian children.

Research design and methods: We studied 2 groups of children: diabetics and their age- and sex-matched non-diabetic individuals as controls.

Results: Data from our study showed that there is not significant higher prevalence of dental caries but significantly higher plaque, gingival inflammation, bad breath (halitosis) and dry mouth in diabetic patients compared with clinically healthy control subjects.

Conclusions: Our study finds that oral health problems in patients with DM can start very early. They become more prominent in adolescent patients. Dentists should be aware of signs, symptoms and treatment options for the disorders which accompany this disease, as well as to examine for such complications, even if the patients have no related complaints.

Keywords: diabetes mellitus, children, oral health, caries, plaque, gingival inflammation, halitosis

Introduction

Diabetes mellitus (DM) is a disorder characterized by high glucose levels and metabolism abnormalities in processing carbohydrates, fats and proteins (2). Diabetes is a life-long disease. Oral complications may be revealed by applying glycemic control. There are some studies among diabetics which show more oral complications or their early appearance compared to diabetes-free individuals matched by age and sex. The relationship between oral health and diabetes has been studied thoroughly in recent years.
Many dental practitioners are often unaware of the attendant oral manifestations in diabetic patients, which results in the prescription of an inaccurate treatment.

Untreated oral infections can adversely affect metabolic control. Patients may present oral conditions that suggest undiagnosed diabetes: progressing severe periodontitis, enlarged gums that bleed easily, or multiple periodontal abscesses. Diabetic patients with poor oral hygiene, a history of smoking, rare dentist check-ups and a high carbohydrate intake are more likely to present caries and periodontitis, and to respond poorly to dental treatment. If the doctor suspects undiagnosed diabetes, the patient should be examined to reveal possible history of polydipsia, polyuria, polyphagia, unexplained weight loss, and family history of diabetes (1).

However, research is not conclusive on all issues. The most important factor that influences oral pathology appears to be the glycemic control of diabetes and, accordingly, different oral complications may surface.

Subject base and methodology

The study pool is based on patients with diabetes mellitus and control groups aged 10 to 18. We studied 53 children divided into 2 groups in order to make valid comparisons in oral health: diabetic children and healthy children as their age- and sex-matched non-diabetic controls. The first group consists of 29 patients with type 1 DM - 12 boys and 17 girls. The second group had 24 healthy subjects who did not suffer from any systemic disease - 13 boys and 11 girls.

Patients with diabetes mellitus type 1 were selected amongst outpatient diabetic children visiting the Diagnostic Consultative Center “St. Marina”, Varna and were examined further in the Faculty of Dental Medicine, Medical University of Varna.

Participants and/or their parents responded to questionnaires concerning their oral and diet habits, dental history, control of diabetes and family history. All examinations were performed by a dentist.

Aim

The purpose of our study is to examine the prevalence, symptoms and signs of oral manifestations of diabetes mellitus type 1 in a sample group of Bulgarian children.

Results

The dentition of all patients was examined visually. We used a probe and a dental mouth mirror. Children from both diabetes and control groups were with mixed or permanent dentition.

We also examined oral hygiene conditions – DI-S (debris index simplified), CI-S (calculus index simplified), OHI - S (oral hygiene index simplified) and PBI (papilla bleeding index). With a special device (figure 1) we measured the halitosis of each patient. It quantifies volatile sulfide and hydrocarbon gas in the mouth comprehensively on a scale from 0 to 5. The severity of odor is thus classified - 0: no odor, 1: barely noticeable, 2: slight but clearly noticeable, 3: moderate, 4: strong, and 5: extremely strong (9).

Unpleasant breath could be related to diabetes mellitus. (It can also be related to poor oral hygiene or gingival diseases). Results showed that children with DM had moderate halitosis and healthy controls had barely noticeable bad breath.

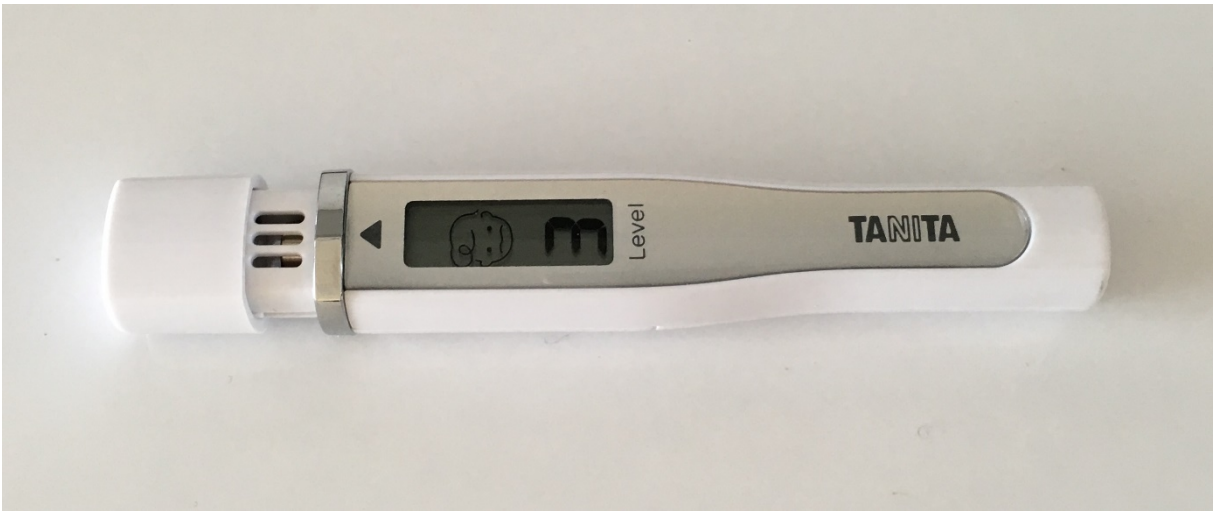

Figure 1.

Table 1.

	DI-S	CI-S	OHI-S	PBI	halitosis
Children with diabetes	1.9	1.0	2.9	65,5%	3
Healthy individuals	0.5	0.4	1,04	33,3%	1

Table 2.

Interpretation		
	DI-S, CI-S	**OHI-S**
Good	0.0-0.6	0.0-1.2
Fair	0.7-1.8	1.3-3.0
Poor	1.9-3.0	3.1-6.0

The data from both groups was compared (Tables 1, 2) Almost all children were with average-controlled diabetes. Along with glycated hemoglobin, we measured average plasma glucose concentration for the past six weeks. In order to monitor metabolic indicators in the patients, blood levels of HbA1c were observed (3,6). The mean value of glycated Hb of diabetic children was HbA1c 8,9 %. Reference values suggest keeping them under 7%. Hence, there is a correlation between controlling glucose levels and oral health.

However, we also found out that patients with DM had no significantly higher prevalence of dental caries, but rather significantly higher occurrence of plaque, gingival inflammation, bad breath (halitosis) and dry mouth compared to the clinically healthy control group (figures 2 and 3).

Our results are summarized in Tables 1 and 2.

The oral hygiene index has two components – the debris index and the calculus index. We discovered that both the debris and the calculus index were higher in patients with DM – respectively 1,9 and 1,0. When we calculated OHI-S, we found out that the oral hygiene of the children with diabetes was fair. Papilla bleeding index was also measured (percentage-wise). Our data showed that 65,5% of children with DM and 31,3% of the healthy individuals had bleeding gums. 8 boys and 11 girls with DM had some soft-tissue inflammation compared to control groups - 5 boys and 3 girls.

Gingivitis and soft-tissue inflammations can progress into a periodontal disease with time. Periodontal problems start in puberty as mild bleeding and gingivitis, subsequently appear as recessions that can lead to severe periodontitis, especially if diabetes is not well controlled. (7) That is why visiting a dentist is so important, especially for diabetics, in order to maintain good oral hygiene.

Figure 2. A 10-year old child with DM, mixed dentition. Very bad oral health

Figure 3. A 17-year old child with diabetes mellitus, permanent dentition

Bad control of or permanent hyperglycaemia represent a basis for diabetic complications and lead to an alteration in the immune system. Thus, there is an increased concentration of glucose in the saliva and in the gingival crevicular fluid. The presence of glucose in the oral cavity increases the proliferation of periodontopathic and cariogenic bacteria (8).

Conclusion

Satisfactory results can be achieved if dentists are aware of signs, symptoms and treatment options for disorders accompanying DM. They must educate parents and children in dental care and oral health. Better communication is advisable between family doctors - the most important medical care providers for children with DM - the kids' families and dental practitioners.

Effective communication between different health care providers is also crucial for safely managing patients with diabetes mellitus.

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