

ORIGINAL ARTICLE

Dental Caries Among Kosovar Children with Type 1 Diabetes Mellitus

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Abstract

Objective: To evaluate the oral health status in children with type 1 diabetes mellitus. Material and Methods: Dental examinations, based on World Health Organization caries diagnostic criteria for DMFT index for permanent dentition and survey were performed among 160 children, aged 10-15-year-old, divided into two groups. The first group consisted of 80 children with type 1 diabetes mellitus (41 females, 39 males), and in the second group, consisted 80 healthy children (49 females, 31 males). Frequency, odds ratio and Mann-Whitney U test were used in the statistical analyses. The level of significance was set at 5%. Results: The higher mean of the DMFT index was found among children with type 1 diabetes compared to the healthy group. The mean DMFT index for diabetic children was 6.56 ± 3.56 and for the healthy group was 4.21 ± 2.63 . Moreover, the frequency of decayed teeth was higher in children with type 1 diabetes than in the healthy group. The higher risk of caries was found in diabetic children compared with healthy for 1.35 times. A higher proportion of children, 61.25% with type 1 diabetes mellitus, reported that they brush their teeth once per day, 22.50% twice per day, and 16.25% rarely. From the healthy group, 46.25% of children brush their teeth once per day, and 42.50% twice per day and 11.25% rarely brush their teeth per day. Conclusion: Diabetic children are at higher risk for caries than are healthy children.

Keywords: Child; Dental Caries; Diabetes Mellitus, Type 1.



Introduction

According to the American Diabetes Association, Diabetes mellitus is a group of metabolic diseases characterized by defects in insulin secretion, insulin action, or both, and manifested with hyperglycemia [1]. This is a chronic metabolic disorder associated with long-term smash up, dysfunction, and malfunction of different organs, in particular, the eyes, kidneys, nerves, blood vessels, and heart. That creates systemic complications and it is one of the leading causes of morbidity and mortality worldwide in affected persons [2,3].

It has been reported several soft tissue abnormalities to be associated with diabetes mellitus in the oral cavity. These complications include salivary dysfunction foremost to a reduction in salivary flow and changes in saliva composition, xerostomia, and taste dysfunction, soft tissue lesions of the tongue and oral mucosa, periodontal diseases (periodontitis and gingivitis), tooth loss, and odontogenic abscesses. Bacterial infections and oral fungal have also been reported in patients with diabetes [4-6].

In recent years the oral health of diabetic patients has been the subject of many studies. Several studies have shown that type 1 diabetes mellitus is associated with an increased risk of dental caries and developing oral diseases including periodontal disease (gingival inflammation and periodontal destruction) [7-9].

Dental caries is a multi-factorial disease that involves the presence of microorganisms and if untreated, causes tooth loss [10]. In different studies, the frequency of dental caries in diabetic patients is a controversial issue [5,11]. Moreover, good oral hygiene, restricted sugar intake, metabolic control and controlled diet affect the improvement of oral health in diabetic patients [12]. Nevertheless, there are other studies related to diabetic patients who have shown the correlation between diabetic patients and high frequency of caries, due to poor metabolic control, poor oral hygiene, systemic complications, age, gender and presence of microorganisms [11].

Control of plaque and debris is necessary for preclusion of inflammatory periodontal diseases and dental caries. Professional recommendation for individual oral hygiene mostly includes teeth brushing at least twice a daily [13,14]. Conversely, worldwide, loads of children brush their teeth less than once a day [15,16].

Hitherto, there is no research showing the oral health status and risk for caries among children with type 1 diabetes in Kosovo. The purpose of this study was to evaluate the oral health among children with type 1 diabetes mellitus in Kosovo.

Material and Methods

Diabetic Group

Eighty children aged between 10 to 15 years old, of the Endocrinology Department of Pediatric Clinic at the University Clinical Centre of Kosovo (UCCK) in Prishtina, with type 1 diabetes mellitus, were included as subjects in this study. The patients who visited the clinic for regular check-ups, throughout the period June 2016 to December 2017, were handed written guidance about the study, and the invitation for a dental examination. Patients, who accepted to take part in the study and matching the criteria (diagnosed with type 1 diabetes mellitus), were scheduled for the dental examination at the Pediatric and Preventive Dentistry Department in the University Dentistry Clinical Centre of Kosovo (PPD-UDCCK). The exclusion criteria for this group with type 1 diabetes were the presence of other systemic disorders unrelated to the complications of diabetes.

Healthy Group (Non-Diabetic)

Upon selection of diabetic children, eighty metabolically healthy children of matching age (10 to 15 years old), who has consecutively attended for the first time dental visit at the PPDD-UDCCK and agreed to participate in the study, were recruited. The exclusion criteria were presence of systemic illness.

Dental Examination

Clinical examinations were performed at the PPDD-UDCCK, by a single doctor, in the dental chair with dental instruments (straight dental mirror and dental probe) under artificial light. The clinical dental health status was measured using the Decayed, Missing and Filled teeth index for permanent teeth (DMFT) according to the WHO caries diagnostic criteria for epidemiological studies [17]. A tooth was marked as decayed (D) when any of the following was observed: unmistakable cavitations on the occlusal, buccal or lingual walls of the tooth, caries roots and filled the tooth with signs of caries. A tooth extracted due to caries was marked missing (M), and a tooth with definitive filling was marked as filling (F) [17].

A systematized form for questioning the parents was used. The form consisted information related to age, gender and brushing habits per day. The questions about brushing habits per day included those options: twice per day, once per day and rarely.

Ethical Aspects

Ethical approval was obtained by the Ethical Committee of Medical Faculty of the University of Prishtina, Kosovo, with Reference Number 4000/2016. Written informed consent was obtained from parents of children that were included in this study.

Statistical Analysis

The statistical tests were performed with SPSS 17 (SPSS Inc., Chicago, Illinois, USA) and Excel 2007 (Microsoft Corporation, Redmond, WA, USA). For estimate caries-associated risk factors Odds Ratio (OR) were summarized with 95% confidence interval (95% CI). The difference in the values of DMFT index for permanent teeth, between type 1 diabetes mellitus and healthy children, was tested using the Mann-Whitney U Test. Differences were set to be statistically significant at p<0.05.



Results

From 80 children with type 1 diabetes mellitus, 39 (48.8%) were male and 41 female (51.2%). The healthy group, non-diabetics children were consisted by 31 male (38.8%), and 49 female (61.2%) (Table 1).

Gender								
Groups	Male		Female		Total		p-value	
	Ν	%	Ν	%	Ν	%		
Type 1 Diabetes Mellitus	39	48.8	41	51.2	80	100.0		
Healthy	31	38.8	49	61.2	80	100.0	>0.05	
Total	70	43.8	90	56.2	160	100.0		

Table 1 Distribution of sample by group and gender.

Table 2 shows the structure of DMFT index for permanent teeth among children with type 1 diabetes mellitus. The mean value of the DMFT index was found 6.56 ± 3.56 . The D value was found higher 4.78 ± 3.19 , than F (1.14 \pm 1.52), and M (0.65 \pm 1.42).

Table 2. DMFT inde	x in	children	with type	1 diabetes	mellitus.
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Variables	Ν	Mean (SD)	CI 95%	Minimum	Maximum
D	80	4.78 ± 3.19	4.07 - 5.48	0	15
Μ	80	0.65 ± 1.42	0.34 - 0.96	0	9
F	80	1.14 ± 1.52	0.80 - 1.47	0	6
DMFT Index	80	6.56 ± 3.56	5.77 - 7.35	0	15

Table 3 shows the structure of DMFT index for permanent teeth among the healthy group. The mean value of DMFT index was lower than in diabetic children 4.21 ± 2.63 . Furthermore, the mean of the D value was found lower in non-diabetic children 1.58 ± 1.90 , compared to diabetic children. The mean value of M (0.75 ± 1.11) and F (1.89 ± 1.65) among healthy children were found a slight bit higher than in diabetic children.

Table 3. DMFT index in non-diabetic children group.

Variables	Ν	Mean (SD)	CI 95%	Minimum	Maximum
D	80	1.58 ± 1.90	1.15 - 1.99	0	11
Μ	80	0.75 ± 1.11	0.50 - 0.99	0	5
F	80	1.89 ± 1.65	1.52 - 2.26	0	8
DMFT Index	80	4.21 ± 2.63	3.63 - 4.80	0	12

The DMFT index of children with type 1 diabetes mellitus was significantly higher (p<0.001) compared to the DMFT index of non-diabetic children. The higher risk of caries was found among diabetic children compared with healthy children (OR = 1.35; 95%CI = 0.29-6.24).

A higher proportion (61.25%) of children with type 1 diabetes mellitus, reported that they brush their teeth once per day, 22.50% from them brush their teeth twice per day, although some children (16.25%) brush their teeth rarely. From the healthy group, 46.25% of children brush their teeth once per day, and 42.50% twice per day, only 11.25% of them rarely brush their teeth per day (Table 4).

Brushing Habits (Per Day)									
Groups	Once		Two Times		Rare		Total		p-value
	Ν	%	Ν	%	Ν	%	Ν	%	
Type 1 DM	49	61.25	18	22.50	13	16.25	80	100.0	
Healthy	37	46.25	34	42.50	9	11.25	80	100.0	< 0.05
Total	86	53.75	52	32.50	22	13.75	160	100.0	

Table 4. Brushing habits between diabetic and non-diabetic children.

Discussion

Children with diabetes are the group endangered by other diseases during their lifetime. Amongst these are dental problems and oral health. This study of children with type 1 diabetes mellitus and healthy children confirmed that none of the subjects had intact dentitions. Similar results have been found in investigations of the frequency of intact dentitions in relation to the diabetes mellitus condition [18-20]. The overall results of this study disclose poor dental health status in both diabetic and non-diabetic children in Kosovo. According to the WHO criteria, the mean DMFT (6.56 ± 3.56) among diabetic group and our healthy non-diabetic group (4.21 ± 2.63) is considered to be of high cruelty level [21].

In the literature, there are different data about dental caries in children with type 1 diabetes. In the present study, children with type 1 diabetes had significantly higher DMFT index compared to the healthy children. Nevertheless, the results in our study reported that dental caries was significantly higher among diabetic children than non-diabetic children. These findings are higher than results previously reported [22-24]. These authors found no difference between both groups related to DMFT index, whereas some authors found than diabetics have lower mean of DMFT compared to the nondiabetic group [23].

The study sample cannot be regarded a representative of the entire population, due to the reasonably small sample size among healthy children. Though, since an earlier study, conducted in Kosovo, reported a DMFT score of 4.36 ± 3.76 among 6-11-years old [25]. The results from our study strongly recommend that there is an urgent need for community-based strategies for caries disease control in Kosovo.

According to our findings, children with type 1 diabetes mellitus have 1.35 times the highest probability of caries comparing with healthy children. It is known that caries expansion is also predisposed by a number of local factors, such as the formation and level of secretion of the saliva and eating habits. Diabetic children are known to reveal the decrease in saliva secretion, due to this changing as a function of the metabolic control [20], which affects the levels of their dental caries [26].

Hyposalivation and decrease in local pH and in the purification effect of the saliva, turn to support the growth of acidogenic bacteria such as lactobacilli, mutans streptococci and Candida, as a

significance of increased dental plaque and decline mechanical clean-up. These altered conditions tend to favor the development of dental caries. The similar results, the high prevalence of dental caries among children with diabetes, have also been reported previously in some studies [27-29]. The risk appraisal was studied among of 64 children with type 1 diabetes mellitus, 8 to 16 years old and it was suggested that a dental caries risk assessment at the children with type 1 diabetes may be a good indicator of overall health care [30].

Commencing through our data there is a difference in relation to tooth brushing habits between children with type 1 diabetes and healthy children. The higher number of children who brush their teeth once a day was found higher among children with type 1 diabetes. Our finding regarding brushing habits among children are comparable with other studies reported [12,31]. Despite, our findings regarding teeth brushing there have been reported better results in other studies [32-34]. The lower dental hygiene combined with other local factors among diabetic children could be considered the increasing the risk of dental caries. Data from this study has shown although, that healthy children know the appropriate frequency of brushing their teeth twice a day, even that the same proportion still brush their teeth once per day. This finding suggested that oral health education should be implemented at an earlier age in order to improve plaque removal and control gingivitis and periodontal diseases [31].

Conclusion

Overall, it is obvious from our findings that the dental condition of healthy children is better than diabetic mellitus children. Consequently, dental professionals must have a wide knowledge of their patients' diabetes. Hence, responsiveness that the patient has diabetes is not sufficient to appraise the effects of diabetes with esteem to dental treatment and oral health. Endocrinologists and dentists, responsible for diabetes treatment should pay attention to general and oral health, especially to dental care and instruction to dental treatment. Teamwork and advisement between the healthy team workers responsible for the treatment of patients with diabetes are vastly recommended. This need is emphasized by the high and ever-increasing number of patients with diabetes globally.

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