ORAL HEALTH AND DENTAL CARE RELATED TO DIABETES STATUS IN YOUNG CHILDREN

Livia Roberta Piedade de **Oliveira**[1] ,Carla **Martins**[1] , Liana Bastos **Freitas-Fernandes**[1], Ivete Pomarico Ribeiro de **Souza**[1]

[1]Department of Pediatric Dentistry and Orthodontics, School of Dentistry, Universidade Federal do Rio de Janeiro, Brazil

Palavras-chave: Criança. Diabetes Mellitus Tipo 1. Higiene Bucal. Cárie Dentária. Manifestações Bucais.

RESUMO

Objetivo: Este estudo compara a saúde bucal, os hábitos alimentares e higiene bucal e a experiência odontológica de crianças com diabetes tipo 1 (DG) e saudáveis (HG) com menos de seis anos de idade. **Métodos**: As crianças foram escolhidas pareadas por sexo e idade em cada grupo. O status de diabetes da DG foi determinado usando os níveis de HbA1c: <8,5% (69 mmol/mol) foi considerado controlado e >8,5% não controlado. Os responsáveis foram questionados sobre higiene bucal, hábitos alimentares e experiência em atendimento odontológico. O exame bucal foi realizado para avaliar índice de cárie (ceod), placa e cálculo, bem como manifestações orais em tecidos moles. Os dados foram descritos e analisados pelo software SPSS 20.0 por meio dos testes Qui-quadrado. **Resultados**: No total, 68 crianças foram incluídas neste estudo. Crianças com diabete diferiram das saudáveis em relação à língua geográfica, hálito cetônico e xerostomia (p<0,05). Apenas 23 % (n=7) dos GD foram considerados como apresentando estado de diabetes descontrolados. Diferenças estatísticas entre o estado diabético controlado e não controlado foram observadas em crianças, como idade no diagnóstico, duração da doença, consumo de açúcar, visitas ao dentista, tipo de experiencia durante a consulta, presença de língua geográfica, cárie dentária, pneumonia relatada e xerostomia (p<0,05). Odontalgia foi a principal razão da ida ao dentista para as crianças DG. **Conclusão**: A saúde bucal e os hábitos alimentares das crianças com diabetes diferiram dos saudáveis. A maioria das crianças com diabetes nunca haviam ido ao dentista antes. Manifestação bucal e hábitos bucais divergem entre crianças com diabetes descontrolados e controlados.

Keywords: Child. Diabetes Mellitus, Type 1. Oral Hygiene. Dental Caries. Oral Manifestations.

ABSTRACT

Objective: This study compares the oral health, dietary and oral hygiene habits and dental care experience of children with type 1 diabetes (DG) to healthy ones (HG) under six years old. **Methods**: The children were chosen matched by gender and age in each group. Diabetes status from DG was determined using HbA1c criteria levels: <8.5% (69 mmol/mol) was considered controlled and >8.5% uncontrolled. Guardians were asked about oral hygiene, dietary habits and dental care experience. Oral examination was performed in order to assess dental caries (dmft), plaque and calculus indexes, as well as oral manifestations in soft tissues. Data were described and analyzed by SPSS 20.0 software through Chi-square and T-tests. **Results**: A total of 68 children were enrolled in this study. Children with diabetes differed from healthy ones in relation to geographic tongue, breath acetone and xerostomia (p<0.05). Only 23% (n=7) of DG were considered as presenting uncontrolled diabetes status. Statistical differences between controlled and uncontrolled diabetic status were observed among children, such as age at diagnosis, disease duration, sugar consumption, dental visits, type of experience during dental appointment, presence of geographic tongue, dental caries, reported breath acetone and xerostomia (p<0.05). Toothache was the main reason that DG children had been to a dentist before. **Conclusion**: Oral health and dietary habits of children with diabetes differed from healthy ones. Most children with diabetes had never been to a dentist before. Oral manifestation and oral habits diverged from children uncontrolled and controlled diabetes.

Submitted: January 12, 2018
Modification: March 23, 2018
Accepted: March 29, 2018

*** Correspondence to:**
Dr. Ivete Pomarico Ribeiro de Souza
Rua Prof Rodolpho Paulo Rocco, 325
CEP: 21941913
Ilha da Cidade Universitária, Rio de Janeiro – RJ –Brazil
E-mail: pomarico@gmail.com Fax/phone: +5521 39382101s

INTRODUCTION

Children with type 1 diabetes is considered a worldwide public health problem and is a serious endocrine-metabolic childhood disorder.[1-3] Its incidence is increasing in many countries, especially in children under five years old.[1-3] Good glycemic control is essential to avoid the progression of the disease, which can lead to many complications including blindness, renal insufficiency and death.[4] Measurement of glycosylated hemoglobin (Hb1Ac) is considered the gold standard for assessing long-term glycemic control. The lower the Hb1Ac value is, the better the control. [1,2] The Hb1Ac value for children under six years old is 8.5% (69 mmol/mol), although it

is usually around 6.5% (48 mmol/mol) for other age groups. The gold standard value is higher than in other age groups because a lower Hb1Ac means the patient has more hypoglycemia, which in small children is difficult to recognize and can lead to cognitive impairment and neurological damage.[1,2,4]

Regarding the oral manifestation of type 1 diabetes, the association between periodontal disease and diabetes is already well established in adults, [5-9] as well as the incidence of xerostomia [10] and breath acetone.[11,12] Diabetes-related parameters have been linked to periodontal problems in children[5,6,13] and also accelerated tooth eruption.[14] On the other hand, it is still controversial whether these parameters are associated with dental caries [15-19] and oral manifestations, such as geographic and coated tongue. [20-25] Several studies have investigated the oral status of children with diabetes in relation to metabolic control compared to healthy children. [6,18, 26-28] However, little is known about the oral health of children with diabetes aged under six years old. Thus, it is not clear whether metabolic control influences the oral health of these children.

Good oral health condition depends on many factors, including dietary and hygiene habits and also the access to dental care. Dental care offered to these children plays an important role in oral health. Children with diabetes visit so many different health professionals in order to manage their diabetes that their oral health is sometimes neglected and they tend to have poor oral hygiene practices.[29-32]

The aim of this study was to compare the oral health, dietary and oral hygiene habits and dental care experience of young children with type 1 diabetes to healthy ones and to investigate the role of diabetic status.

MATERIALS AND METHODS

Study population

A case-control epidemiologic study was performed after being approved by the local Ethics in Human Research Committee from HUCFF/UFRJ following the CEP 196/96 and received protocol number 482.780/2. It was conducted in full accordance with the ethical principles of the World Medical Association Declaration of Helsinki. [33] We obtained written informed consent from all parents/legal guardians. A total of 68 children with primary dentition were divided into two groups matched by age and gender. The group with diabetes (DG) was composed of children with type 1 diabetes under treatment at the Diabetes Ambulatory Clinic of the Pediatric Hospital of the Federal University of Rio de Janeiro (UFRJ), recruited from June, 2013 until June, 2014 while the healthy group (HG) were selected from the Pediatric Dentistry Clinic at the Department of Pediatric Dentistry and Orthodontics, UFRJ, and was composed of children with no history of systemic disease.

Parental reports

The parents/legal guardians were requested to provide information about *dietary habits* (sugar consumption frequency), o*ral hygiene habits*, *oral health perception* (dry mouth sensation and breath acetone) and dental care experience.

Diabetes – related variables

Medical data related to DG were obtained from the medical records, such as: capillary glucose values; duration of disease (years since diagnosis); the child's age at the moment of diagnosis of type 1 diabetes; history of complications associated with diabetes; insulin regimen (multiple daily insulin injections or continuous subcutaneous insulin infusion) and glycosylated hemoglobin values – Hb1Ac – whereby Hb1Ac<8.5% (69 mmol/mol) was considered controlled and >8.5% uncontrolled.

Clinical examination

Oral health assessment was performed in all 68 children by a single pediatric dentist (Oliveira, LRP) following international criteria in order to assess the following different conditions:

Oral manifestation: A complete intraoral soft-tissue examination was performed with a dental mirror and gauze square. The diagnosis of any oral soft tissue condition was established based on onset, duration, oral habits, clinical appearance, history of dental trauma and previous episodes. The locations and descriptions of the lesions were also recorded and photographed.

Dental caries experience: The condition of each surface was recorded using the decayed, missing, filled index (dmf-t). The diagnosis criteria followed those proposed by WHO. [34]

Oral hygiene: The O'Leary Plaque Index was used to assess presence of dental biofilm in four surfaces for each tooth. The presence or absence of plaque was evaluated, regardless of its amount, and the corresponding index was obtained as a percentage on summing the results and dividing by the total number of points explored. [35] As a result, below 25% is considered as a satisfactory hygiene score.

Presence of calculus: The calculus index scores were recorded on the four tooth surfaces (mesial, distal, buccal and lingual), and the quantity of calculus was assessed at the cervical area of every tooth. The numerical scores of the plaque index were calculated according to the formula: per person = sum of individual scores/number of teeth present for each person and expressed in percentage.

At the end of the examination, each patient received

oral hygiene instruction and a kit with toothpaste and toothbrush. A dental prophylaxis was offered. Every child was registered as a patient at the Pediatric Dentistry Clinic, UFRJ. Urgent dental care was immediately performed for those who needed it, while the others were scheduled for regular visits.

Data and statistical analysis

Data were described and analyzed through SPSS 20.0 software (IBM, Chigago, USA). First, we directly compared cases and controls using unadjusted Student's t- or Chi-square tests. Then we compared children with controlled and uncontrolled diabetes status using Student's t- or Chi-square tests.

RESULTS

In this study the age of the enrolled children ranged from 1 to 6 years, the mean age was 4±1.25 years old. In each group, 50% of the children were female (n=17). Table 1 shows the results in relation to the oral condition of children with diabetes, which differed significantly from healthy children regarding dental caries and oral manifestations ($p<0.05$). The children with diabetes showed lower scores of dental caries compared to the healthy children since the mean dmft index was 1.38±4.61 for DG while for HG, the mean dmft was 5.30±0.945 ($p<0.05$). Plaque and calculus indexes also varied between the groups, but with no significant difference ($p>0.05$). In soft tissues, oral manifestations were observed with a prevalence of 35.3% for DG, with only 9% among children from HG ($p<0.05$). Geographic tongue was the only oral manifestation of DG while HG presented 2.9% for geographic tongue and 6.1% for stomatitis ($p<0.05$).

Information reported by the DG guardians related to oral hygiene and dietary habits, oral health perception and dental care experience patterns showed differences compared to HG. Xerostomia showed a prevalence of 52.9% (n=18) and breath acetone 47.1% (n=16) ($p<0.001$). Regular sugar consumption and habits of eating snacks and candies also showed a difference between the groups, whereby 20.6% of children with diabetes (n=7), consumed less sugar than children from HG (n=1; 3%) ($p<0.05$).

Regarding the diabetes status, three children had recently been diagnosed with type 1 diabetes and there was not enough data about their Hb1Ac levels (69 mmol/mol) to allow their diabetes status to be established. These children were then removed from the analysis regarding the association between diabetes status and the other parameters investigated in this study. From those children with an established diabetes status, 23% (n=7) were considered uncontrolled. The mean duration of disease was 1.29±1.1 and 1.77±1.01 years for those controlled and uncontrolled, respectively. Age at diagnosis was 2.55±1.12 years old for those controlled and 1.78±1.06 years old for the uncontrolled ones. The vast majority (n=33) had an insulin regimen ranging from 3–5 shots a day, while one child had an insulin pump. Furthermore, diabetes status control showed some influence on the oral status of these children, as seen in Table 2, which shows the diabetes-related variables between the children with type 1 diabetes.

Table 1: *Differences between children with diabetes (DG) and healthy (HG) children regarding to oral examination, oral health perception, dietary and oral hygiene habits*

Group Parameters	DG (n=34)	HG(n=34)
dmft index (mean)*	1.38±0.46	5.30±0.94
Decayed teeth (mean)*	0.94±2.13	3.55±4.26
Missing teeth (mean)*	0.97±0.16	2.24±0.39
Filled teeth (mean)*	0.40±0.07	1.34±0.23
Caries-free children (%)*	64.7	31.3
Plaque (O´Leary Index) (%)	9.41±7.68	9.82±8.51
Dental hygiene	satisfactory	satisfactory
Calculus Index (%)	1.59±2.19	1.19±5.72
Presence of oral tissue manifestations (%)*	35.3	9
Reported xerostomia (%)*	52.9	0
Reported breath acetone (%)*	47.1	0
Regular sugar consumption (%)*	79.4	97
Eating snacks and candies between meals (%)*	73.5	97
Perform oral hygiene (%)	84.8	93.9
Children referred to Dental Care by medical staff (%)*	61.5	40
Dental Visits (%)*	27.3	81.8
Pain as the main reason of the visits (%)*	38.5	63
Restorative treatment performed (%)	12	35.7
Extraction or endodontic treatment performed (%)	24	32.1

*Note: * means p<0.05 T-Test*

Table 2: *Sample characteristics of DG regarding to diabetes status and the main variables which differed between controlled (HbA1C<8.5%) and uncontrolled (HbA1C>8.5%) diabetics.*

	Controlled - DG (n=24)	Uncontrolled - DG (n=7)
Diabetes Status*	67%	25%
Cappilary blood Glucose*	186±84.02mg/dl	280±115.45mg/dl
Hb1Ac* (%)	7.27±0.94%	9.48±0.64%
Duration of diasease (years)	1.29±1.1	1.77±1.01
Age at diagnosis (years old)*	2.55±1.12	1,78±1,06
Geographic tongue (%)*	29.2	57.1
Breath acetone (%)*	41.7	71.4
Xerostomia (%)*	45.8	71.4
Regular sugar consumption (%)*	79.2	100
Caries-free children (%)*	62.5	85.7
Dental visits (%)*	33.3	0%
Oral hygiene habbits (%)*	91.7	57.1

*Note: * means p<0.05 (T-Test) or Chi-square test*

DISCUSSION

To the best of our knowledge, this is the first study to assess dietary and oral hygiene habits, dental care experience and oral health perception related to oral status and diabetes status control in children with type 1 diabetes under six years old. Our data showed low dental caries prevalence among children with diabetes in comparison to healthy children while we observed that the findings in the literature are controversial. High caries levels in children with diabetes were found to be associated with age, plaque scores and decreased salivary flow rate, but were not associated with the level of metabolic control of diabetes. [16-17] On the other hand, Tagelsir *et al*. [15] compared a group of 52 children with diabetes aged 3- to 16 years old to a group of matched healthy controls and reported that there were no significant differences in the level of caries. An epidemiologic Brazilian study (SB-BRASIL)[36] in 2010 with 5-year-old children from Rio de Janeiro showed similar levels [36] (dmft: 1.14/ 77% caries-free) to those of the children with diabetes in our study (dmft: 1.38/64% caries-free), demonstrating that the children with diabetes are not more susceptible to caries at this age. Reported xerostomia and breath acetone differed between the groups, as did the dietary and oral hygiene habits and dental care access.

In this study, uncontrolled children aged under 6 years old made up 23% of the total number of children with diabetes enrolled, which is in accordance with previous studies. [5,6] A total of 54% poorly controlled diabetic children aged 6 to 12 years old were observed by El-Tekeya *et al*. (2012), which is confirmatory to studies with older children and adolescents . [18] Thus, age plays a role in the glycemic control of children with type 1 diabetes because the youngest children receive full-time mother's care in comparison with the older ones. Moreover, adolescents are frequently the ones who experience poor metabolic control.[28]

An association between an increased level of HbA1c with the presence of halitosis has been described.[12] Some authors have suggested breath acetone as a biomarker of poor metabolic control in children with diabetes, [11,12] since ketonic bodies are increased in uncontrolled patients. Our study corroborates the literature, as breath acetone and xerostomia were significantly increased in the uncontrolled children.

Our data showed that geographic tongue, also known as benign migratory glossitis, was the most prevalent oral manifestation among children with diabetes and this condition has previously been associated with type 1 diabetes patients. [20] The prevalence of geographic tongue was higher among those patients with diabetes, but the etiopathogenesis remains unknown. Greater prevalence of fungi has been described in patients with geographic tongue, especially those who do not brush the surface of the tongue. [26,27] It is important to have in mind that previous publication point out that benign migratory glossitis is common in young age between 6 to 12 mouth[24] and, the prevalence is 21% in 0-5 years old in Brasil. [25] Since we did not perform a fungi count in our study, we suggest that more studies should be performed to understand better the oral condition of children with diabetes, in order to prevent the complications related to the disease, such as burning sensation, xerostomia and severe periodontal disease in later age.

Regarding diabetes control, there was no difference among caries level but there were significant differences when related to low dental attendance among the children with diabetes and associated with a high level of untreated decayed teeth, which corroborated with previous studies, [15-19] showing that oral health is still a neglected area in diabetes care. We also observed that uncontrolled children had more geographic tongue, xerostomia and breath acetone than those with controlled diabetes, showing that deficient diabetes

control is linked to deficient oral health.

A limitation of this study was that there were few children with uncontrolled diabetic status. Good metabolic control for DG reflects how important the medical care offered to these children is and how good is the diabetes care is since their recruitment was from a reference center for pediatric diabetes management. Another limitation would be the recruitment of healthy children from a dental clinic, since most of them were in need of dental treatment. Blind longitudinal studies should be performed in the future in order to elucidate the presence of oral manifestation in children with type 1 diabetes.

In our study, low attendance to dental care was observed. Although, most of the DG guardians affirmed that they performed the oral hygiene of the children and many of them had already been instructed in oral hygiene, the information about oral hygiene comes from the medical staff and not from dental professionals. Physicians should refer the children with diabetes to a dentist for adequate evaluation of the buccal condition as well as to apply preventive measures. The present findings are in agreement with Dale *et al.*[30] who also reported that medical doctors are the first health professionals to warn the population with diabetes about the importance of oral health. Thus, it is crucial that physicians have knowledge about the importance of oral health and its relationship with general health. On the other hand, dental professionals should be able to recognize the signs and symptoms of diabetes and feel comfortable treating patients with diabetes, since there is a global burden of diabetes and, nowadays, it is more common to receive patients with such systemic conditions in the dental office.

Regarding the question of referral to a dentist, some guardians answered that they had been already requested to do it by their medical doctors. It is important to highlight that although they may be referred by the medical doctor, most children with diabetes do not follow through the instruction to attend a dentist's appointment. Of those who were referred, most guardians took their children to visit a dentist, showing how influential the physicians are in relation to the behavior of the parents/guardians. However, even with the recommendations and referrals made for the patients with diabetes and their families, and with these patients being placed in a reference center, most of the children have never been to a dentist. Consequently, the level of untreated dental decay among the children with diabetes was higher in those children who had never been to a dentist, reflecting the lower attendance of children with diabetes to dental treatment, corroborating the findings of Tagelsir *et al.*[15] It must be highlighted that of those children with diabetes who had already had dental treatment, toothache was the main reason for going to the dentist.

In terms of dental care, oral examination is one of the steps of the initial diabetes visit for diabetic children and adolescents as recommended by the American Diabetes Association.[1] Taken together, our data suggest that prevention, early treatment of oral manifestations and healthy dietary and oral hygiene habits in young patients with diabetes reconsidered to prevent further buccal complications, such as the occurrence of periodontal disease.[5-9,13] This may be important in creating healthy habits from childhood, because adolescents are known as a difficult population for managing metabolic control related to diabetes.[28] It is important to design a special oral health program for the daily care of children with diabetes as well as a professional approach to treating this special group.

In conclusion, the oral health of children with diabetes differed from healthy ones. Most children with diabetes have never been to a dentist before. Children with uncontrolled diabetes differed from those children with controlled diabetes both in oral manifestation and oral habits.

ACKNOWLEDGMENTS

The authors are grateful to the study participants and their families, who generously participated in this study. The authors thank Caroline Renda, who worked on data collection in the earlier stages of the study, as well as Dr. Ludmila Luescher and Dr. Jorge Luescher, both from the Diabetes Ambulatory Clinic from Hospital of the Federal University of Rio de Janeiro. Fundação Carlos Chagas Filho de Amparo à Pesquisa do Estado do Rio de Janeiro (FAPERJ – E-26/110490/2014) and CAPES.

REFERENCES

1. American Association Diabetes. Standards of Medical Care in Diabetes - 2014. Diabetes Care 2014;37(supplement 1) S-14-S80.

2.Maahs DM, West NA, Lawrence JM, Mayer-Davis EJ. Epidemiology of type 1 diabetes. Endocrinol Metab Clin North Am 2010;39:481-97.

3.Gale EA. The rise of childhood type 1 diabetes in the 20th century. Diabetes 2002;51(12):3353-61.

4.Consensus statement on the worldwide standardization of the hemoglobin A1C measurement: the American Diabetes Association, European Association for the Study of Diabetes, International Federation of Clinical Chemistry and Laboratory Medicine, and the International Diabetes Federation. Diabetes Care 2007; 30:2399-400.

5.Lalla E, Cheng B, Lal S, Kaplan S, Softness B, Greenberg E, et al. Diabetes mellitus promotes periodontal destruction in children. J Clin Periodontol 2007; 34: 294-8.

6.Lalla E, Papapanou PN. Diabetes mellitus and periodontitis: a tale of two common interrelated diseases. Nat Rev Endocrinol 2011; 7: 738-48.

7.Vergnes JN. Treating periodontal disease may improve metabolic

control in diabetics. Evid Based Dent 2010; 11: 73-4.
8. Preshaw PM, Alba AL, Herrera D, Jepsen S, Konstantinidis A, Makrilakis K, et al. Periodontitis and diabetes: a two-way relationship. Diabetologia 2012;55:21-31.
9. Barnes VM, Kennedy AD, Panagakos F, Devizio W, Trivedi HM, Jonsson T, et al. Global metabolomic analysis of human saliva and plasma from healthy and diabetic subjects, with and without periodontal disease. PLoS One 2014; 9:e105181.
10.Moore PA, Guggenheimer J, Etzel KR, Weyant RJ, Orchard T. Type 1 diabetes mellitus, xerostomia, and salivary flow rates. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2001; 92: 281-91.
11.Qiao Y, Gao Z, Liu Y, Cheng Y, Yu M, Zhao L, et al. Breath ketone testing: a new biomarker for diagnosis and therapeutic monitoring of diabetic ketosis. Biomed Res Int 2014;2014: 869186.
12. Al-Zahrani MS, Zawawi KH, Austah ON, Al-Ghamdi HS. Self reported halitosis in relation to glycated hemoglobin level in diabetic patients. Open Dent J 2011;5:154-7.
13. Saminsky M. Periodontal Disease and dental caries among children and adolescents suffering from Endocrine disorders- A literature Review. Pediatr Endocrinol Rev 201715(2): 165-172.
14.Lal S, Cheng B, Kaplan S, Softness B, Greenberg E, Goland RS, et al. Accelerated tooth eruption in children with diabetes mellitus. Pediatrics 2008; 121:1139-43.
15.Tagelsir A, Cauwels R, van Aken S, Vanobbergen J, Martens LC. Dental caries and dental care level (restorative index) in children with diabetes mellitus type 1. Int J Paediatr Dent 2011; 21:13-2.
16.Siudikiene J, Maciulskiene V, Nedzelskiene I. Dietary and oral hygiene habits in children with type I diabetes mellitus related to dental caries. Stomatologija 2005; 7: 58-2.
17. Karjalainen KM, Knuuttila ML, Kaar ML. Relationship between caries and level of metabolic balance in children and adolescents with insulin-dependent diabetes mellitus. Caries Res 1997; 31:13-8
18. El-Tekeya M, El Tantawi M, Fetouh H, Mowafy E, Abo Khedr N. Caries risk indicators in children with type 1 diabetes mellitus in relation to metabolic control. Pediatr Dent 2012; 34:510-6.
19.Lai S, Cagetti MG, Cocco F, Cossellu D, Meloni G, Campus G, Lingstrom P,. Evaluation of the difference in caries experience in diabetic and non-diabetic children –A case Control study Plos One 2017; 30; 12(11):e0188451...
20.Wysocki GP, Daley TD. Benign migratory glossitis in patients with juvenile diabetes. Oral Surg Oral Med Oral Pathol 1987; 63:68-70.
21.Negrato CA, Tarzia O. Buccal alterations in diabetes mellitus. Diabetol Metab Syndr. 2010;2:3.
22. Saini R, Al-Maweri SA, Saini D, Ismail NM, Ismail AR. Oral mucosal lesions in non oral habit diabetic patients and association of diabetes mellitus with oral precancerous lesions. Diabetes Res Clin Pract 2010; 89: 320-6.
23. Lifshitz F, Casavalle PL, Bordoni N, Rodriguez PN, Friedman SM. Oral Health in children with Obesity or Diabetes Mellittus. Pediatr Endocrinol Rev 2016, 14(2):159-167.
24.Riohoo-Crespo Mdel R, Planells-del Pozo P, Rioboo-Garcia R. Epidemiology of the most common oral mucosal diseases in children. Med Oral Patol Oral Cir Bucal 2005; 10: 376-87.
25. Bessa CF, Santos PJ, Aguiar MC, do Carmo MA. Prevalence of oral mucosal alterations in children from 0 to 12 years old. J Oral Pathol Med 2004; 33:17-22.
26.Dudko A, Kurnatowska AJ, Kurnatowski P. Prevalence of fungi in cases of geographical and fissured tongue. Ann Parasitol 2013; 59:113-7.
27.Merchant AT, Oranbandid S, Jethwani M, Choi YH, Morrato EH, Pitiphat W, et al. Oral care practices and A1c among youth with type 1 and type 2 diabetes. J Periodontol 2012; 83:856-63.
28.Saes Busato IM, Bittencourt MS, Machado MA, Gregio AM, Azevedo-Alanis LR. Association between metabolic control and oral health in adolescents with type 1 diabetes mellitus. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2010; 109: 51-6.
29. Lindenmeyer A, Bowyer V, Roscoe J, Dale J, Sutcliffe P. Oral health awareness and care preferences in patients with diabetes: a qualitative study. Fam Pract 2013; 30:113-8.
30.Dale J, Lindenmeyer A, Lynch E, Sutcliffe P. Oral health: a neglected area of routine diabetes care? Br J Gen Pract 2014; 64:103-4.
31.Kuzmiuk A, Marczuk-KoladaG, Luczaj-Cepowicz E, Obidzinska M, Chorzewska E, WasilczukU, Kierklo A, Szajda SD. Importance of dental care to maintain oral health of children and youth with type 1 diabetes Med Pr 2018 1;69(1):37-44.
32.Rafatjou R, Razavi Z, Tayebi S, Khalili M, Farhadian M, Dental Health Status and hygiene in children and adolescents with type 1 diabetes mellitus. J Res Health Sci 2016; 16(3): 122-26.
33.World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. J Am Coll Dent 2014; 81:14-8.
34..World Health Organization (WHO) – Oral Health Surveys Basic Methods. Geneve 1997.
35..O'Leary TJ, Drake RB, Naylor JE. The plaque control record. J Periodontol. 1972; 43: 38-2.
36.. SBBrasil2010. SBBrasil2010, Brazil, http://dab.saude.gov.br/bVs/publicaçõ/pesquisa_nacional_saúde_bucal.pdf [accessed 23.06.2016]