Association between Metabolic Control, Salivary Status and Caries in young patients with Type 1 Diabetes.

Pappa E. [1]*; Vastardis H. [1]; Rahiotis C. [1]; Vazaiou-Gerasimidi A. [2]

[1]Dental School, National and Kapodistrian University of Athens, Greece

[2]Diabetes Center of P&A Kyriakou Children's Hospital, Athens, Greece

AIM

The aim of this study was to investigate the possible association between salivary dysfunction and incidence of caries, in relation to the level of metabolic control, in children and adolescents with type 1 diabetes.

METHODS

For the purpose of this study, a total of 150 children and adolescents (4-18 years old) were examined and allocated among 3 groups: 50 patients poorly-controlled (HbA1c>8%), 50 well-controlled (HbA1c≤8%) and 50 age- and sex-matched healthy controls. The study was approved by the Research Ethics Committee of University of Athens and the parents signed written informed consent. All subjects were examined for dental caries, oral hygiene and salivary factors. Assessments of salivary function included self-reported xerostomia, quantification of resting and stimulated whole saliva flow rates, pH values, buffering capacity and saliva's viscosity. Caries incidence was recorded using DMFT and dmft index. Plaque index and gingival index were additionally evaluated. Data were analysed by Chi-square and Kruskal-Wallis tests.

Resting Flow Rate Evaluation:
The lower lip is dried using a piece of gauze and a time observation is carried out until small beads of saliva start to appear. If saliva appears in less than 30 sec, the patient has a healthy resting flow rate.

Resting pH Evaluation:
To gather resting saliva, the patient is asked to refrain from swallowing for 30 sec and then instructed to expectorate all saliva into a cup. The sample is tested with an indicator paper, and the pH is assessed against a universal indicator colour scale.

Stimulated Flow Rate Evaluation: The patient is given a piece of unflavoured paraffin wax to chew and expectorates any saliva produced into a measuring cup for five minutes. Normal rate: 1ml/min.

Buffering Capacity Evaluation:
A drop of stimulated saliva is placed with a pipette on each of three pads on the test strip. The pads are assessed for colour change and scored according to the guide. All three scores are added together to give a buffering index.

Table 1: Demographics for subjects

	Well Control	Poor Control	Healthy
Number of Subjects	50	50	50
Age(yrs),mean (SD)	13.2 (4.4)	11.9 (3.9)	12 (2.8)
Gender, n (M/F)	22/28	20/30	26/24
Time with DM1 (yrs), mean (SD)	5.3 (2.5)	5.8 (3.4)	-
HbA1c,mean (SD)	6.5 (0.9)	11.2 (1.8)	-

Table 2: Grouping of salivary characteristics for the statistical analysis

Salivary Characteristics	Grade	Grade
Resting Flow Rate	Low	Low
	High	High
Stimulated Flow Rate	Low	Low
	Medium	Low
	High	High
Viscosity	Thick	Thick
	Bubbly	Thick
	Watery	Watery
pH	Very Low	Low
	Low	Low
	Normal	Normal
Buffering Capacity	Very Low	Low
	Low	Low
	Normal	Normal

RESULTS

The results indicated higher caries levels and a decreased unstimulated salivary flow rate in poorly-controlled diabetics. The average caries indexes were DMFT 3.6 for poorly-controlled, DMFT 1.2 for well-controlled, DMFT 1.5 for healthy subjects, $p \leq 0.05$). Salivary status and caries index were not found to be significantly different between well-controlled patients and healthy controls.

Evaluation of Xerostomia	Well-C	Poor-C	Healthy
1. Mouth dry?	12 % [a]	34 % [b]	5 % [c]
2. Mouth moist?	15 % [a]	46 % [b]	8 % [c]
FOX QUESTIONNAIRE:			
a. Do you have to sip liquids to aid in swallowing dry foods?	11 % [a]	12 % [a]	6 % [b]
b. Does your mouth feel dry when eating a meal?	8 %	9 %	4 %
c. Do you have difficulty swallowing dry foods?	9 % [a]	15 % [b]	4 % [a]
d. Does the amount of saliva in your mouth seem to be too little?	12 % [a]	32 % [a]	8 % [b]
'YES' to any of the above (FOX SUMMARY)	14 % [a]	35% [b]	9 % [c]

Statistically significant differences between groups with different letters (a, b, c)

	Thick/ bubbly viscosity*	Low resting flow rate*	Low pH for resting saliva*	Low stimulated flow rate	Low pH for stimulated saliva	Low Buffering Capacity	DMFT * (mean/SD)	Plaque Index
Well Control	18% [a]	24% [a]	20% [a]	5%	5%	10%	1.2 (1.3) [a]	23%
Poor Control	65% [b]	82% [b]	70% [b]	18%	15%	20%	3.6 (2.4) [b]	45%
Healthy	0% [a]	0% [a]	10% [a]	0%	0%	10%	1.5 (1.6) [a]	30%

* Variables with statistically significant difference ($p<0,05$)

CLINICAL SIGNIFICANCE

Dental managements strategies for young patients with type 1 diabetes should be individualized and should possibly include more frequent visits, intensive fluoride application and dietary evaluation and counseling.

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