SALIVARY PH AND THE TAMPON CAPACITY OF THE STIMULATED SALIVA IN DIABETICS CHILDREN VERSUS NON-DIABETICS CHILDREN

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Cuvinte cheie: *pH, capacitate tampon, diabet*

Rezumat: *Modificările parametrilor salivari pot creşte riscul de apariţie a cariilor la copii cu diabet zaharat. Scopul studiului este de a măsura pH-ul salivar şi capacitatea tampon a salivei la subiecţii diabetici în comparaţie cu subiecţii nediabetici. Au fost cuprinşi în studiu 143 de copii, 68 de copii diabetici şi 75 copii nediabetici cărora cu ajutorul benzilor de testare le-a fost determinat pH-ul şi capacitatea tampon a salivei. Rezultatele au arătat existenţa corelaţiilor statistice semnificative (p<0.0001) relevând o diferenţă între media pH-ului diabeticilor, fiind o salivă moderat acidă, spre o salivă acidă (6,3529) şi media pH-ului nediabeticilor fiind o salivă sănătoasă (7,4133). La diabetici capacitatea tampon este foarte scăzută (5,09) iar la nediabetici este ridicată (9,61), existând astfel şi în cazul capacităţii tampon o diferenţă semnificativă (p<0.0001). În concluzie atât pH-ul salivar cât şi capacitatea tampon a salivei sunt semnificativ mai scăzute la pacienţii diabetici decât la cei nediabetici.*

Keywords: *pH, buffer capacity, diabetes*

Abstract: *Changes in salivary parameters may increase the risk of cavities in children with diabetes. The aim of the study is to measure the salivary pH and buffer capacity of saliva in diabetic subjects compared with non-diabetic subjects. In the study were 143 children, 68 diabetic children and 75 non-diabetic children on which using the test strips it was determined the pH and buffer capacity of saliva. The results showed the existence of significant statistical correlations (p <0.0001) revealing a difference between the average pH of diabetes, being a moderately acidic saliva, to an acid saliva (6.3529) and average pH of non-diabetic being a healthy saliva (7.4133). Buffer capacity in diabetics is very low (5.09) and in non-diabetic is high (9.61), so the buffer capacity has a significant difference (p <0.0001) also. In conclusion the salivary pH and buffer capacity of saliva are significantly lower in diabetic patients than in non-diabetic.*

INTRODUCTION

Studies show that the number of cases of diabetes type I and II in children is increasing in many countries. In the literature are data showing proof of differences of salivary secretion and composition in patients with diabetes compared to non-diabetic subjects.

PURPOSE OF THE STUDY

Measurement of salivary pH and the establishment of the buffer capacity of stimulated saliva of the diabetic subjects compared with non-diabetic subjects.

MATERIAL AND METHOD

In the study were 143 children, 68 diabetic children and 75 non-diabetic children. The study group ranged in age from 5-18 years. Both groups were homogeneous in terms of age and sex.

1. Salivary pH: We instruct the patient to expectorate any pooled saliva into the collection cup.Take a pH test strip and place it into the sample of resting saliva for 10 seconds(fig.1).After the 10 seconds it is checked the colour of the strip. The colour obtained is compared with the testing chart. Thus saliva may be:

- between 5 and 5,8 higly acidic
- between 6 and 6,6 moderately acidic
- between 6,8 and 7,8 healthy

Figure no. 1. Salivary pH testing

2. Buffer capacity of saliva: We instruct the pacient to chew the piece of wax to stimulate salivary flow, after that on a period of 5 minutes the pacient expectorates the collected saliva(fig.2). Loosen the foil pack protection of the buffer capacity test strip and put the strip on an absorbent tissue. Test strips are used immediately after the package was opened. Ussing a pipette, it is collected sufficient saliva from the collection cup(fig.3) and a drop of saliva is distributed on each of the three areas on the test strip(fig.4). Immediately turn the stripe 90˚ so that the napkin can absorb the excess saliva. This maneuver will prevent the excess saliva from swelling the test strip and thus do not affect the accuracy of the result. Test strips will begin to change color immediately after 2 minutes (fig. 5). The final result is calculated by giving to each of the final color the corresponding table points after the conversion table(fig. 6). Where a colour combination provides an unclear result it is used an intermediate scores.

Test pad colour at 2 minutes:

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Article received on 01.03.2010 and accepted for publication on 9.03.2010
ACTA MEDICA TRANSILVANICA September 2010; 2(3)273-275

- green 4 points
- green/blue 3 points
- blue 2 points
- red/ blue 1 point
- red 0 points

Collect the three figures obtained and interpreted the final results:

- a very low buffer capacity
- 6-9 a low buffer capacity
- 10-12 normal to high buffer capacity

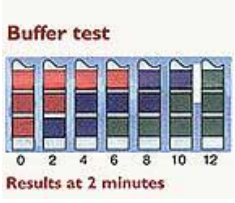
Figure no. 2. Expectorating the saliva

Figure. no. 3. The collection of saliva

Figure no. 4. Saliva droplet distribution

Figure no. 5. Test strips after 2 minutes

Figure no. 6. Conversion table



Data processing was obtained using statistical test T.

RESULTS

It is noted statistically significant correlations (p <0.0001) revealing a difference between the average pH for diabetes and average pH for non-diabetes, meaning that people with diabetes have lower average pH, a moderately acidic saliva, to an acid saliva (6.3529) when the average of non-diabetic is more healthy(7.4133) (tabel no.1). Low salivary pH in patients with type 1 diabetes is a clear reduction of the saliva buffer capacity and an increased risk of dental caries. There are reports showing that diabetic patients have more acid saliva, while others reported no such difference. It is unclear whether the risk of caries may be greater in children patients with diabetes mellitus because of the damage to salivary factors, compared with non-diabetic children. In addition to conflicting reports, salivary parameters should be measured in children with diabetes, because most clinical trials have so far been conducted only on adults.

Table no. 1. Ph saliva in diabetic patients versus non-diabetic

Type	N	Mean	Std. Deviation
Ph			
diabetes	68	6.3529	.3458
non-diabetes	75	7.4133	.4428

Table no. 2. Buffer capacity of saliva in diabetics versus non-diabetic

Type	N	Media	Std. Deviation
Buffer capacity of saliva			
diabetes	68	5.09	1.59
non-diabetes	75	9.61	2.46

A high saliva buffer capacity can be observed in non-diabetic, mean buffer capacity of saliva being 9.61. This value is placed in the third category of normal to high buffer capacity. Buffer capacity of saliva in diabetics with an average of 5.09 is classified in the very low buffer capacity category. We have a significant difference indicated by p <0.0001 between the average of the buffer capacity of saliva for diabetes and average of the buffer capacity of saliva for non-diabetes (table no. 2.).

Subjects with a low pH has also a lower buffer capacity existing a significant difference p <0.001. It is known that an acid pH increases the risk of dental cavities.

DISCUTIONS

Lopez et al. observed small differences between sexes in both groups at the pH due to the differences in age and gender.

Some authors have found significant differences between diabetics and the non-diabetic patients regarding buffer capacity of stimulated saliva, as in this study, but there were authors that did not found differences. Average buffer capacity values found by Swanljung et al. in diabetic children was 5.1 and 7.4 in the non-diabetic(2).

Thorstensson et al. came at the conclusion after the study on diabetic vesus non-diabetic children, that there is no significantly differences between groups regarding the buffer capacity.

Differences between results may also be due to different methods for determining.

CONCLUSIONS

1. Buffer capacity of saliva in diabetics is significantly less and fits the category of very low saliva buffer capacity versus non-diabetic children who fit normal to high buffer capacity category.
2. Patients with diabetes had a significantly lower salivary pH compared with the non-diabetic patients pH. Average

salivary pH was 6.35 for diabetic children representing an acid saliva while the non-diabetic have an alkaline saliva with an average of 7,41.

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