

SALIVARY CALCIUM – ITS ROLE IN THE DENTAL DECAY ETIOPATHOGENESIS

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Abstract: Considering the data from the specialist works in the field, the study of the determination of the total salivary calcium aims at its aspects involved in the etiopathogenesis of the dental lesions clinically encountered at the 120 patients under study.

Cuvinte cheie: calciul salivar, etiopatogenia leziunilor carioase

Rezumat: Pornind de la datele literaturii de specialitate, studiul urmărește, prin determinarea calciului salivar total, aspectele de implicare al acestuia în etiopatogenia leziunilor carioase depistate clinic la cei 120 de pacienți luați în studiu.

INTRODUCTION

Histological studies have played an important part in acknowledging the idea that "a dental cavity is not only an easy process of progressive demineralization, but merely an alternant process of decay and rebuilding" (Lăcătușu).

In the course of the last years there have been issued studies that attest the success of the conservative theory through the remineralization of the incipient lesions by using various methods meant to reduce dental decay morbidity.

Clinical and laboratory research have shown a series of characteristics common to the vast majority of patients in the emergence and development of dental lesions.

1. the existence of a specific area on the dental surface
2. the existence of some intermittent periods of demineralization and remineralization.
3. a period of demineralization is succeeded by the disintegration of the organic component and the emergence of cavities.
4. if in the process of emergence of dental lesion, remineralization phenomena are predominant for a certain interval of time, then the lesion stops at a certain moment, becomes static, and those tissues previously decrepit solidify.

MATERIAL AND METHOD

The clinical examinations taken in order to complete the medical file were followed by saliva sampling with the purpose of having a number of biochemical determinations of the pH, of the salivary buffer capacity and of the total salivary calcium.

The experiment was carried in identical conditions to all 120 patients under medical survey in two distinct lots, on one hand the dental decay active ones and on the other hand the dental decay resistant ones. The following steps were carried out.

- § clinical check up of the patients
- § saliva sampling
- § determination of the total salivary calcium
- § determination of the salivary pH
- § determination of salivary buffer systems – salivary inorganic phosphates.

The Determination of the Total Salivary Calcium

The autoanalyser LISA 500 is programmed from a computer which is attached to the apparatus and it automatically does all necessary calculations, including the dilutions, in case their values go out of linearity. For accuracy, it is recommended to daily ensure the standardization of the apparatus and to check it with control serum.

Apart from this colorimetric test meant to dose the total salivary calcium through the method "Calcium – MTB", one can also use the determination test with orto-crezofalein.

Figure no.1. The autoanalyser LISA 500



RESULTS AND ASSESSMENTS

On the basis of a complete and complex examination, as it was stipulated in the individual medical files, it resulted that out of the total of 120 patients under study aged between 11 and 60 years, a number of 66 were females and 54 were males, corresponding to a 55% and 45%, respectively.

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CLINICAL ASPECTS

Table no. 1. The frequency of dental decay resistant and dental decay active patients

Total patients	Dental decay resistant	Dental decay active
120	48	72
100%	40%	60%

Table no. 2. Sex repartition of the patients under study

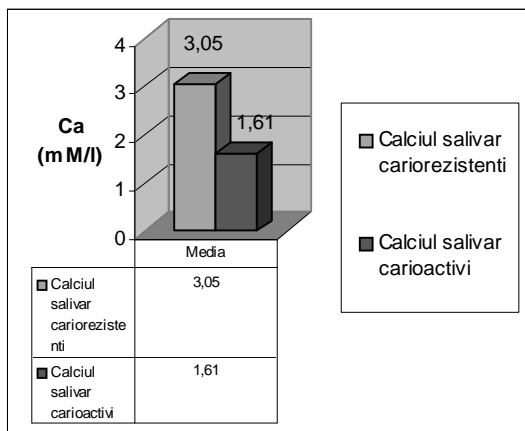
Total number of patients	Women	men
120	66	54
100%	55%	45%

The results that have been gathered after the calculation of the salivary calcium average value for the two distinct lots were as it follows:

- dental decay resistant = 3,05mM/l
- dental decay active = 1,60 mM/l.

The graph explains the difference between the two salivary calcium values.

Figure no. 2. Interrelation salivary calcium – dental cavity



Interrelation salivary calcium – dental cavity

Due to the presence of Calcium ions and phosphate the human saliva has a remarkable potential in the remineralization of the decayed enamel, a relatively constant potential in the same individual, but different from one individual to another. The mineral component of the enamel, dentine and cement is the hydroxyapatite [1]. At a neutral pH, the hydroxyapatite is in equilibrium with the oral environment, saturated with ions of Ca²⁺ ...

Deminerlization process is reversible if the pH is neutral, and if there are enough ions of Ca and PO₄ in the liquid environment.

The deminerlization process consists in the precipitation of the Ca and Phosphate ions in the oral environment under the form of insoluble calcium phosphates and which are incorporated in the deminerlized enamel, thus annulling the incipient flaws that emerged as a result of a superficial deminerlization.

An impediment that cannot be ignored in the process of an optimal mineralization is constituted by some organic substances in the liquids from the oral cavity as the mucous. Due to its increased affinity to hydroxyapatite, this one forms an adherent pellicula at the surface of the enamel that plays the role of a diffusion barrier in the way of the ionic remineralized transport. On the other hand, the presence of the F ions constitutes an important factor that facilitates an in-depth penetration of the remineralized ions into the deminerlization flaws.

The salivary calcium, in a 1-3mM/l, appears under a

free or chemically combined form, depending on the value of the pH.

Researches have attempted to identify a correlation between the frequency of dental decay in the case of some individuals and the calcium and phosphate salivary levels in the plaque. Thus, it has been evidenced a small difference of super saturation between those categories of active and resistant individuals to dental decay. This difference is mainly caused by 0,3 units. Even though this difference in pH is very small, it still determines important clinical implications, which are probably due to the different mineralization potential of the two mucous-bacterial plaques (in dental decay active and dental decay resistant subjects).

The salivary calcium phosphates participate in the compound of the salivary buffer systems, having a role in maintaining the stability of the mineral equilibrium of the dental hard tissues in the processes of deminerlization and remineralization that occur in the oral cavity; at the same time they ensure a nutritive environment for the development of the bacterial glicolize.

The saturation of the saliva with calcium phosphate constitutes an important factor in maintaining a low solubility of the enamel, the Ca and H₂PO₄ ions diminishing the dislocation of the Ca from the dental hard tissues. As long as the saliva stratum in contact with the dental tough surface is saturated with Ca phosphate, its release from the hard dental tissues cannot occur.

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