“LUCIAN BLAGA” UNIVERSITATY OF SIBIU
“VICTOR PAPILIAN” FACULTY OF MEDICINE

CORRELATIONS OF THE SALIVARY CALCIUM WITH THE ETIOPATHOGENY AND DENTAL CARIES THERAPY IN CHILDREN

SUMMARY OF THE PhD THESIS

Scientific Advisor :
Prof. Ph.D. MIHAI LEONIDA NEAMȚU

PhD Candidate:
Dr. PICU OANA ELENA

Sibiu - 2012

SYNOPSIS OF THE GENERAL PART

Dental cavity disease is nowadays considered to have the longest duration of evolution in the living span of the human and an endemic and epidemic character. Although it recorded a negligible incidence of fatal rate through an increased morbidity level (68,8% of the recorded patients above 3 years, the dental cavity disease has acquired a top priority concern within national and international health programmes.

The Modern Medical Pattern applied in the present day treatment of the cavity aims at preventing the occurrence of dental decay through specific measures of dental health awareness and acknowledgement: the discontinuity of the evolution of the incipient cavity lesions and the measures taken to facilitate their retrieval; the maximum range of conservation of the dental structures, the prevention of the diffusion of dental infections and their complications. (12, 71).

Saliva plays an important part in the preservation of a healthy state of the hard dental tissues and of the perioral tissues. The balance between demineralization-remineralization processes depends on the concentrations of the salivary parameters: *calcium, phosphate* and the *pH*.

Recent researchs relying on much more precise methods of salivary parameter determination, studies which focused on a keener monitoring of the cavity activity of the patients – separated in two categories of dental decay active and dental decay resistant patients – have recorded a reversed proportionality between the number of cavity lesions and the salivary concentrations of calcium and phosphates.

SYNOPSIS OF THE SPECIALTY PART

THE PURPOSE OF THE STUDY

The study here aims at bringing a modest contribution to the salivary parameters as factors of cavity prevention; a way of evaluating and anticipating both cavity susceptibility and cavity resistance of each individual subject to the present study , considering also the salivary parameters. Bivalent cations such as Ca^{2+}, Mg^{2+}, Zn^{2+}, etc, play an important role within the human organism, the saliva composition being influenced by these cations, especially by Ca^{2+}. The study here laid a great deal of emphasis on both curative treatment and on prophylactic treatment as well. There were

taken therapeutic measures which resulted in the discontinuity of the oro-dental sites of infection, the alkalin diet, salivary flow stimulation, the increase in the resistance of the dental email through therapies of local remineralization.

Recent specialist studies contain a gret deal of publications pertaining to the concentration of the salivary parameters and oro-dental health, and the interest shown in these aspects connected to the issue of cavity lesion is on increse. The progress in this direction of salivary parameter research, their role in the dental cavity disease became possible due to the fact that many technologies have become effective in the dental care practice.

The research study here assumes the following objectives:

1. To study the causality relation between the values of the salivary parameters: salivary calcium, phosphates and salivary pH and the incidence of dental cavity upon the patients under study;
2. To determine some correlations pertaining to possible alterations of their concentrations (for each parameter), recorded at the patients under study and the various degrees of cavity diffusion;
3. To analyze the types of correlation with statistic significance among the salivary parameters studied;
4. To label patients according to some risk groups, according to the DMF indicator;
5. To assess cavity risk before and after the intervention for a secondary prevention of the dental cavity;
6. To assess the efficiency of the cavity discontinuity treatment and of the secondary prevention of the disease.

As secondary objectives we considered the following:

1. the incidence of cavity lesions on the patients under study from the perspective of the way of applying of the means of oral hygiene;
2. the evaluation of the state of oral health and the salivary parameters at the school population ranging from 6 to 18 years.
3. the selection and the establishment of the factors which determine the oral status of the children part of the study lot (cavity active and cavity resistant);

4. through the he remineralization of the incipient lesions, the recommendation of an alkaline diet and the use of fluorines, as well as through routine controls a significant decrease of the incidence of cavity lesions has been recorded.

MATERIAL AND METHOD

MATERIALS AND METHODS

The research consists in a prospective study conducted between 2006-2011 on a sample of 516 patients aged 6-18 years old of which 140 were young male patient and 376 young female patients. Patients were I to XII form students from the dental school cabinet where I work. They were medically surveyed and treated during these four years of the completion of the present PhD thesis.

This study group was divided into age groups: 6 to 11 years, 12 to 14 years, 15 to18 years; they were also based on the DMF values, in groups of dental decay active and dental decay resistant individuals. In the dental office the patients were seen according to WHO recommendations and the data were recorded in forms of prophylaxis.

Based on clinical and laboratory data that were obtained, and from laboratory tests performed in order to determine the salivary parameters (Ca, phosphate and salivary pH), we aimed at: 1) establishing the individual treatment for the patients, and the prevention methods that are required, 2) the prophylactic and curative treatment performance and control timing for the reconsideration of dental health status; 3) the correct applying age-appropriate methods caries prophylaxis on the study group, as part of treatment plan, 4) identifying the importance of the preventive elements ensuing the regular checks in reducing the incidence of dental caries.

As part of he clinical monitoring of patients at intervals of 6 respectively 12 months a new endo-and exo oral exam was performed in order to quantify emerging new carious lesions, oral hygiene examination, the compliance of the indicated alkaline diet or its absence, the use of toothpastes rich in calcium and flour and, last but not least, the restorative treatment of the new issuing caries.

The research was divided in two stages of evaluation:

1. Comparative: an active-decay group and a resistant-decay group for each salivary parameter, by age and sex;

2. Analytical: for each salivary parameter (including the establishment of correlations)
3. Reconsideration of the salivary parameters after 6 months and 12 months ensuing the treatment applied.

RESULTS

I. EVALUATION OF DENTAL STATUS FOR THE STUDIED PATIENTS

Based on individual values of the DMF index, there resulted two study groups, one group of sactive-decayubjects, 384 in number (74%) and a control group of resistant-decaysubjects , 132 in number (26%). Based on its full and complex evaluation, stipulated in individual observation forms, it was emphasized that the total of 516 patients taking the study aged between 6 and 18 years, a total of 376 were female and 139 were male, with the respective percentages of 76% and 24%.

After dividing patients into groups on the criteria of age groups and sex, there resulted 3 age groups:

1. Group I (6 - 11 years old) with a total of 150 patients under study of which 63 were male and 87 female. Among them there were 49 dental decay resistant children (29 boys and 20 girls) and 101 dental decay active children (34 boys and 67 girls).

2. Group II (12 - 14 years old) with a total of 102 patients subject to study, of which 28 male and 74 female. Among them there were 30 dental decay resistant children (11 boys and 19 girls) and 67 dental decay active children (19 boys and 48 girls).

3. Group III (15 -18 years old), with a total of 264 patients subject to study of which 46 boys and 218 girls. Among them there were 48 dental decay resistant children (14 boys and 34 girls) and 216 dental decay active children (32 boys and 184 girls).

Most dental caries are registered in the last age group (15-18 years old) with 1722 dental carioes were detected out of 2560, representing 67.26%. It was found that 62% of patients present a poor dental care. Brushing technique is not performed properly at 62% of them, the fluoride therapy is realized in 77% of patients through the use of toothpastes and very few through the use of fluoride and / or chlorhexidine mouth wash. 73% of the patients reported to the dental office only after the occurrence of discomfort or pain caused by caries.

From the total number of the patients under study, the female patients recorded a total of 2060 of carious lesions and at the male patients were examined a total of 500 carious lesions.

If the age group ranging between 6-11 years, there were recorded a total of 414 carious lesions and in the age group between 12-14 years there were found a number of 424 carious lesions, then the age group between 15-18 years is characterized by a total of 1722 dental caries. However, if for the female patients there is a statistically significant difference ($p = 0.029$) between the number of caries detected at active-decay group from resistant-decay group, we cannot assert the same about the male patients, where there is no statistical correlation ($p = 0.217$) between the number of cavities and age groups studied in both groups.

The incidence of cavity lesions is at an alarming level in all age groups only 39 (7.55%) were recorded as cavity-free (without caries).

II. THE CURATIVE AND PREVENTIVE TREATMENT OF THE STUDIED PATIENTSă

The treatment of dental lesions has been a necessity in order to solve the cases studied. Prophylactic and curative treatment principles are intended to remove local etiopathogenic factors by applying differential measures and methods that are most appropriate and by the application of long lasting fillings carefully made according to current standards. The treatment aimed at halting the progress of the existing caries, the desinfection of dentin wound and the morpho-functional restoration of the tooth. The treatment applied to the active-decay group with increased cariogenic risk involves improving the oral hygiene, diet, temporary restoration of cavitary lesions with cement, glass-ionomer, which protects the remaining tooth structure, enhances remineralization of existing lesions, limits expansion of cariogenic flora to the rest of the oral cavity.

The treatment was done by appointments program, taking into account the need for phased working time depending on the severity of existing lesions.

After examining and removing caries infection, we conducted a thorough professional cleaning and scaling. It aimed at promoting dental health by raising the patient’s awareness regarding the prophylactic methods to prevent caries: acquiring correct brushing techniques, the recommendation to use at home dental plaque revealing, indication of a specific diet avoiding cariogenic foods. During the treatment patients were taught to consider toothbrushing as a therapeutic procedure - which made their daily dental hygiene as correct as possible.

Patients aged 6 to 13 years old, and those aged 15-18 years old in a smaller proportion were subject of sealing of pits and fissure work; those older than 13 years have been been subjected to sealing performed in an extensive way in cases where conditions allowed us to. We have followed the principles of maximum compliance of hard dental structures. We also developed a treatment plan to remove the harmful action of causal factors. Materials that were used for long-term coronary reconstructions were chosen according to the physiognomic principle for the front teeth and according to resistance for the posterior teeth , where biting pressure are maxims.

The group of patients studied and treated (6-18 years), presented statistically significant differences between the mean values of salivary parameters and the type of treatment performed: patients which were performed dental works of sealing pits and fissures presented elevated values of calcium, phosphates and salivary pH.(p=0.000)

For the group of active-decay patients there are significant statistic differences between the mean salivary phosphate, with patients who were treated for pulp capping (direct or indirect) and those with sealing. The mean salivary phosphate is significantly higher for those who were made pulp capping and sealing of pits and fissures to those who have been subjects of only dental capping (direct or indirect). (p = 0.000) For the resistant-decay group of patients who were treated in this study, there were statistically significant differences between the mean salivary phosphate, which is increased in those who were made capping and sealing of pits and fissures. (p = 0.000)

If for the males patients there are no statistical significance in salivary calcium values between those who were subjects to the sealing and capping treatment, for female patients treated during this study, there are statistical significant differences between salivary parameter values and types of treatments. The parameter values are significantly higher in those who achieved sealing compared with those who have been made only direct / indirectcapping . (p = 0.000)

Final coronal restoration totalling a number of 2400, according to the type of cavities, were as follows: 1020 for the type of class I, class II - 720, 240 for Class III, IV – 300, for class type V- 120.

6 months later, from the total of 516 patients there were detected 76 new caries: 108 patients presented changes in salivary concentrations of parameters of whom 50 patients had new dental caries. Out of those 50 patients 22 were male presenting 30 new carious lesions and 28 female presenting 46 new carious lesions.

12 months after the initial outbreak treatments in 6 patients, 2 male and 4 female, there were found a total of six new dental carious, 2 new lesions in males and 4 new lesions in female patients.

III. EVALUATION OF SALIVARY PARAMETERS IN PATIENTS: ACTIVE-DECAY GROUP AND RESISTANT-DECAY GROUP

Human saliva, due to the presence of Calcium and phosphate ions has a great potential for remineralization of dental enamel carious lesions, which is quite consistent at the same individual and varies from one individual to another. The mineral component of the enamel, dentin and cementum is hydroxyapatite Ca10 (PO4) 6 (OH) 2. At neutral pH values, hydroxyapatite is in equilibrium with the oral environment, saturated with Ca2 + ions and PO43-. The process of demineralization is reversible if the pH is neutral and there are enough ions of Ca2 + and PO43- in the oral medium.

The remineralization mechanism consists of precipitation of Ca and phosphate ions in the oral environment in a form of insoluble calcium phosphate which is incorporated into demineralized enamel, thus annihilating early defects arising from superficial demineralization.

Objectives:

1) analysing the existence of a causal relationship between salivary parameters values: salivary calcium, phosphate and salivary pH, and caries incidence in studied patients, 2) determining any parameter changes in concentrations for the patients studied correlated with different degrees of active dental caries; 3) analysing the types of correlations with statistical significance between salivary parameters that we studied; 4) analyzing the relationship between salivary parameters and dental status of studied patients; 5) assessing the relationship between salivary parameters and dental caries analyzed before and after the curative and preventive treatment.

The research was divided into stages of evaluation:

At the initial evaluation:

After analysing the results of the average salivary calcium the recorded indices were as follows:

- the resistant-decay group = 1.89 mM / l
- the active-decay group = 1.16 mM / l

Based on the results obtained after laboratory measurements, aiming at salivary pH values for the two groups of patients, we found:

- the active-decay group = 6.47
- the resistant-decay group = 6.99.

The results after the calculation of the average buffer capacity for the two groups of patients, show a lower value to the active-decay group (2.01 mM / l) unlike the values obtained for the resistant-decay group (3.14 mM / l).

There is a significant difference ($p = 0.000 < 0.001$) between the mean values for salivary parameters determined for these two groups, namely, for the resistant-decay group female patients, the values of salivary parameters were significantly higher than those obtained for the active-decay group female patients, which is observed in all three age groups. The salivary calcium values obtained at the first examination are significantly higher in all three age groups of female patients resistant-decay compared to those obtained for active-decay group.

After analyzing the correlation between salivary parameters in female patients, it appears that large amounts of calcium in saliva were determined in patients with fewer dental carieus ($p = 0.000$, $t = -0.321$). It can also be said that higher values for salivary pH and salivary phosphates were obtained from patients with fewer dental caries ($p = 0.000$) and salivary calcium increases when salivary pH increases. Analyzing the female patients, by age groups, the situation is relatively the same, except for the age group 6-11 years where it results that there is no statistical significance between the valeus of salivary phosphate and the high values of pH and also between the values of salivary phosphate obtained at patients with low number of dental caries.

There is also no statistical significance between the high values of salivary calcium and the low values obtained for salivary pH at a first examination for this age group. Instead, they can emphasize that they have obtained high levels of salivary calcium in conjunction with low salivary phosphate and low dental caries ($p = 0.001$) and low salivary pH were obtained from patients with a great number of caries. ($p = 0.037$)

In male patients there is a significant statistic difference between the mean values of salivary parameters Ca, phosphates, pH and the number of dental caries in both groups of patients, the resistant-decay group compared to the active-decay group. What is apparent is that salivary phosphate and salivary pH values are higher for those resistant-decay group, for these patients, the number of dental carieus being reduced. ($p = 0.000$)

In the present study, it appears that high levels of salivary calcium were determined in patients with high values of salivary pH ($p = 0.013$), and fewer dental caries ($t = -0.225$, $p = 0.008$), low values of salivary phosphates were obtained for patients with a high number of dental caries ($t = -0.397$, $p = 0.000$). Also, low values of salivary pH were determined in patients with numerous cavities ($t = -0.399$, $p = 0.000$

Overall, for the male patients one can say that there is a statistically significant correlation between high values of salivary calcium and pH, and it appears that low salivary calcium were determined in patients with multiple dental caries. ($p = 0.008$, $t = -0.225$). Also, increased values of salivary phosphate and pH were obtained for patients who had fewer carious lesions. ($p = 0.000$)

Orthodontic status assessments and salivary parameters after 6 months

Following the treatment of all dental caries the patients studied returned to regular checks carried out at individual periods of time (6 months). Within these controls there were carried out assessment, diagnosis or treatment procedures of new dental caries. With respect to medical indications, the values of salivary parameter should be relatively normal, higher than those obtained at the first examination, while clinically to notice the lack of new carious lesions. We repeated the clinical measurements of the salivary parameters in the same conditions as at the start of the study, after 6 and 12 months.

Based on complete and comprehensive review, and based on individual observation papers, it was proven that out of all 108 patients with ages between 6 and 18 years, appointed 6 months after the treatment, there were recorded changes in parameter values of the salivary and/or new dental carious lesions. From these a total of 59 were females and 49 males, the percentage representing 54.6%, respectively 45.4%. The analysis revealed a number of 70 new dental caries, the highest frequency in the age group of 6-11 years old and 15-18 years old, totalling a number of 30 and 32 new dental caries lesions (43% , 46%).

In male patients, of all those checked after 6 months with changes of salivary parameter values and/or carious lesions we can assert that there is a significant correlation between the values of salivary calcium and pH ($p = 0.000$) in the sense that these values remained high 6 months after the first examination, it decreased the number of carious lesions compared with the baseline ($p = 0.033$) but we can not say that there is a statistically significant correlation between the values of salivary phosphates obtained at the first examination and those derived at the 6 month check up. ($p = 0.294$)

In female patients, of all patients attending the control of six months with changes in salivary parameter values and/or new dental caries lesions we can state that there is a significant correlation between salivary calcium values (p = 0.000), phosphate (p = 0.000) and salivary pH (p = 0.001), meaning that these values remained high after 6 months comparable with the initial examination, and it can be said that this led to a decrease in the number of carious lesions as compared to the original. (p = 0.000)

In all patients studied according to the criterion of age, active-decay group vs. resistant-decay group:

For the age group 6-11 years, one can assert that there are significant statistical correlations between the values obtained at the first examination and those obtained after 6 months of rehabilitation. (the values of salivary parameters remained high) (p = 0.000). The values of salivary calcium (p = 0.000) and pH (p = 0.002) remained significantly elevated after 6 months, the high values has led to fewer dental caries in these patients (p = 0.001). Conversely, for salivary phosphates can not be said that there were significant increases in this age group. (p = 0.587)

For the age group 12-14 years, there is no significant statistical correlation between the values obtained for salivary pH at 6 months (p = 0.685), the values of the other salivary parameters remained high in comparison to those obtained at the first examination. (p = 0.000). The number of caries has decreased significantly (p = 0.015).

Also, for the age group 15-18 years, the values of salivary parameter increasedsignificantly from the initial examination. (P = 0.000) and the number of carious lesions decreased significantly (p = 0.000).

Male patients analysis by age groups:

For the males patients, aged 6-11 years, there is a significant statistical difference between the mean values of salivary calcium, salivary pH and the number of dental caries, meaning that after 6 months the salivary parameters increased significantly from baseline (p = 0.000) and the number of cavities decreased significantly too. (p = 0.000). If the initial values of salivary calcium and phosphates were increased, they remained elevated after 6 months from the dental treatment (p = 0.000), thing which can not be said about salivary pH (p = 0.532), whose growth is not statistically significant.

For the males patients, aged 12-14 years it can be said that there is a significant statistical correlation between baseline calcium levels (p = 0.006) and salivary

phosphate's values (p = 0.001) initially obtained and those obtained at 6 months; but not the same can be said about the recorded salivary pH values (p = 0.490) and the number of new dental caries (p = 0.066). The values of salivary parameters: calcium and phosphates remained significantly elevated after 6 months (p = 0.018 respectively (p = 0.001).

For the male patients, aged 15-18 years, although the values of the salivary parameter remained elevated from baseline (p = 0.000) and decreased the number of carious lesions (p = 0.000) it can not be said that there was a significant statistical correlation between them.

Female patients analysis by age groups:

For the female patients, aged 6-11 years, there is a significant statistical difference between the mean values of salivary calcium and the number of dental caries, meaning that after 6 months the mean salivary parameters: calcium (p = 0.000) and pH (p = 0.001) increased significantly from baseline and the number of cavities decreased significantly from baseline. (p = 0.017). If the initial values of salivary calcium and pH were high, they remained significantly elevated after 6 months, which can not be said about the values of salivary phosphates (p = 0.059) (increase but not significantly).

For the female patients, aged 12-14 years, it can be siad that there is a statistical correlation between baseline values of salivary calcium and phosphates originally obtained and those obtained at 6 months, but not the same thing can be said about the values of salivary pH (p = 0.241) and the number of new carious lesions that occurred (p = 0.098), the increase of the pH values and the decrease of dental caries was not statistically significant.

For the female patients of the age group 15-18 years, there is a strong significant statistical correlation between the values of salivary parameters initially obtained and those obtained 6 months after the treatment. The values of salivary calcium (p = 0.000), pH (p = 0.000) and salivary phosphates (p = 0.000), increased significantly after 6 months.

The comparative evaluation of salivary parameters after 6 months in patients with salivary changes in parameter values and with or without new dental caries:

Making a comparison between patients examined after 6 months with changes in salivary parameters, with or without new dental caries, we can say that there is a statistical significance between the values of salivary calcium obtained and the number of newly emerged cavities; the values of calcium were significantly higher in the patients without

new carious lesions. (p = 0.000). It can also be said that there is a statistical significance between the values obtained for salivary pH and the number of newly emerged cavities, the pH values were significantly higher in those with no new dental lesions. (p=0.000)

A comparative evaluation of the salivary parameters in all male patients (6-18 years) in the group of patients with changes in salivary parameters with or without new carious lesions: elevated values of salivary calcium at 6 months determined a statistically significant reduced number of caries (p = 0.010).

A comparative evaluation of the salivary parameters to all female patients in the group of patients with changes in salivary parameters with or without new carious lesions (6-18 years): there is a significant correlation between the values of the salivary parameters obtained at 6 months and those initially obtained . We can say that elevated levels of calcium (p = 0.006), phosphates (p = 0.047) and salivary pH (p = 0.000) determined statistical significant reduced number of caries (p = 0.000).

A comparative evaluation of salivary parameters in all patients with changes in salivary parameters with or without new carious lesions in both sexes in the age group 6-11 years old: there is a statistical significant difference between the values of the salivary calcium obtained in patients with new dental caries as compared to those without new dental caries at 6 months. It can be said that an increase of values of salivary calcium have decreased the occurrence of new carious lesions. (p = 0.001).

A comparative evaluation of salivary parameters in all patients with changes in salivary parameters with or without new carious lesions in both sexes in the age group 12-14 years: there is a statistical significant difference between the obtained values of salivary phosphates both initially and at the 6 month chech up, in those with dental cavities versus those without cavities. We can say with 99% accuracy that salivary pH and salivary phosphates increased significantly at 6 months in those without new dental caries than those with new dental caries (p = 0.001).

A comparative evaluation of salivary parameters in all patients with changes in salivary parameters with or without new carious lesions in both sexes in the age group 15-18 years: there is a statistical significant increase in the values of salivary phosphates (p = 0.008) and pH (p = 0.016), obtained at 6 months, in those without new dental caries than those with new dental caries.

A comparative evaluation of salivary parameters in all male patients with changes in salivary parameters with or without new carious lesions age group 6-11 years: there is

a statistical significant difference in the values of salivary calcium in those without new dental caries than those with new dental caries.($p = 0.014$).

A comparative evaluation of salivary parameters in all females patients with changes in salivary parameters with or without new carious lesions in the age group 6-11 years: we can also say that there is a statistical significant difference between the mean values of salivary calcium and pH in patients with new dental caries than those without. ($p = 0.045$, $p = 0.047$)

A comparative evaluation of salivary parameters in all male patients with changes in salivary parameters with or without new carious lesions age group 12-14 years: decreasing salivary pH values caused significant development of new carious lesions ($p = 0.036$).

A comparative evaluation of salivary parameters in all female patients with changes in salivary parameters with or without new carious lesions in the age group 12-14 years: in female patients the mean high calcium salivary did not determine a statistically significant decrease in dental caries, with no significant differences between values obtained in those with caries than in patients without ($p = 0.464$). However, there are significant differences between the mean salivary phosphate ($p = 0.010$) and salivary pH ($p = 0.003$) in those with caries than in those without dental injuries.

A comparative evaluation of salivary parameters in all male patients with changes in salivary parameters with or without new carious lesions age group 15-18 years: the mean values increased of salivary calcium, phosphates and pH, did not determine the statistically significant decreas of new dental caries and there is no significant diference between the patient with new dental caries and those without.

A comparative evaluation of the salivary parameters in all female patients, with changes in salivary parameters with or without new carious lesions in the age group 15-18 years: there is a statistical significance between low levels of salivary phosphates and newly emerged carious lesions. ($p = 0.011$) (elevated values of salivary phosphates in those without caries than those with new cavities). Also in this category, it can be said say that there is no statistical difference between the mean values of salivary calcium ($p = 0.096$) and salivary pH ($p = 0.067$) obtained at 6 months in patients with carious lesions than those without.

The evaluation of orthodontic status and salivary parameters after 12 months

The appearance of new dental caries in different age groups were mainly due to the many behavioral, physical, microbiological factors: uncorrected habits, poor oral hygiene;then to the manner in which orthodontic care instructions are followed, no use of fluoride during tooth development and training as indicated by dose, high intake of refined carbohydrates, risk factors specific to each patient.

A comparative assessment of salivary parameters to the entire study group at 12 months (6-18 years): there is a significant statistical difference between values of the salivary parameters obtained in the patients with new dental caries than those obtained from dental cavity-free subjects (decreases in the levels of these salivary parameters determined the occurrence of new caries lesions). ($p = 0.000$, $p = 0.001$, $p = 0.000$).

A comparative assessment of salivary parameters in male patients in the entire group (6-18 years): the values of the salivary parameter obtained at 12 months were significantly higher in those without dental caries than those with dental caries.

A comparative assessment of salivary parameters in female patients of the whole group (6-18 years): a significant increase of calcium ($p = 0.021$) and salivary pH ($p = 0.001$) were determined in those without caries than those obtained in patients with new caries lesions. However, salivary phosphate values do not show a statistically significant difference in patients with new caries lesions than in those without caries. ($p = 0.126$)

The comparative evolution of salivary parameters and number of cavities in 12 months from the first assessment and at 6 months

The total number of subjects of both sexes (salivary parameters / No. Cavities) in the first examination, 6 and 12 months (6-18 years): In all patients with changes in salivary parameters with or without caries lesions we can not say that there is a significant statistical correlation between the average values obtained at 12 months compared to those obtained at baseline and at 6 months. One can say that there is a significant statistical difference between the number of caries lesions found at 12 months than those found at baseline and at 6 months. ($P = 0.003$, $p = 0.025$)

The entire lot of male patients (salivary parameters / No. Cavities) in the first examination, 6 and 12 months (6-18 years): there is a strong statistically significant correlation between the salivary parameter values (calcium and phosphate) originally obtained at 6 months and those obtained at 12 months, they moved upward significantly, but it can not be said that there is a correlation between those and the newly emerged caries ($p = 0.000$).

The entire lot of female patients (salivary parameters / No. Cavities) in the first examination, 6 and 12 months (6-18 years): there is a strong significant statistical correlation between the elevated values of salivary pH obtained in the initial phase at 6 months and 12 months, and the low number of new caries lesions occurred in 12 months. ($p = 0.006$)

The evaluation of salivary parameters in the age group 6-11 years, both sexes (salivary parameters / No. Cavities) in the first examination, 6 and 12 months: there is no significant statistical correlation between the values of salivary parameters, the values obtained in the three stages of the determinations of laboratory, and the number of caries lesions. It is noticed, however, a decreased number of dental caries and of values of salivary phosphate, and also a slight increase in the mean salivary calcium and pH values.

The evaluation of salivary parameters in the age group 12-14 years, in both sexes (salivary parameters / No. Cavities) in the first examination, 6 and 12 months: there is no significant statistical correlation between the values of salivary parameters, the values obtained in the three stages of determinations laboratory and the number of caries lesions. It is observed however fewer dental injuries and also a slight increase in mean salivary calcium, phosphate and pH.

The evaluation of salivary parameters in the age group 15-18 years both sexes (salivary parameters / No. Cavities) in the first examination, 6 and 12 months: there is no statistically significant correlation between the salivary parameters values, the values obtained in the three phases of laboratory assessment, and the number of caries. It is noted however a decreased number of dental injuries and also a slight increase in mean salivary calcium, phosphate and pH.

CONCLUSIONS

1) In the 516 patients studied, the number of carious lesions detected in patients active-decay group is significantly higher than the resistant-decay group.

2) The incidence of caries is an alarming level in all three age groups studied, the maximum age group 15-18 years for both sexes, but predominantly in female patients.

3) The lack of interest in the terapeutic-preventive act is seen in over 80% of the patients, presenting them to the dental office only when pain occurs.

4) The lack of information and attention to hygiene and oro-dental health, the lack of health education programs of interest to dental prophylaxis, and prevalence of cariogenic diets, points out that 80% of children do not go to the first examination at regular intervals to the dentist.

5) Dispensary and regular dental checks made as short periods of time (six months) are designed to limit the destructive effects of caries disease.

6) With age, the group of dental decay active patients becomes the target of curative treatment where the case study become more complex; for the age group 15-18 years there is a predominance of pulp capping and number of coronary reconstruction.

7) At the first examination, salivary parameter values obtained in patients who have undergone only prevention of dental caries (pits and fissures sealing), are significantly higher than those shown in patients whose treatment included preventive and curative treatment of caries (pulp capping).

8) There are significant differences between the type of treatment carried out (sealing the pits and fissures and pulp capping), and the values of salivary parameters analyzed in males, increased salivary phosphate and pH were determined only in patients with sealing pits and fissures and not those who have made sealing grooves and fissures and pulp capping.

9) Efficiency of curative-prophylactic treatment was demonstrated by decreasing the number of carious lesions clinically detected in the evaluation at 6 months and 12 months.

10) The values of salivary parameters (calcium, phosphate and pH) were significantly higher in dental decay active patients versus dental decay resistant patients.

11) In female patients, the DMF index significantly negatively correlates with the salivary concentrations of each parameter for all three age groups, while in male patients it is valid only for the age group 15-18 years.

12) At 6 months, the incidence of emerging caries is higher in 15-18 age group, female patients.

13) Following curative-prophylactic treatment applied to the subject patients the salivary parameter values increased significantly with the significant decrease in the number of carious lesions.

14) Analyzing the dynamic age groups: For the age group 6-11 years (both sexes), curative-prophylactic treatment applied caused a statistically significant increase in salivary calcium only a statistically significant reduction of caries.

15) For the age group 12-14 years in both sexes curative-prophylactic treatment applied caused a statistically significant increase in salivary calcium and phosphate only.

16) For the age group 15-18 years after curative-prophylactic treatment: theapplication was a statistically significant increase in salivary parameters and a statistically significant reduction of caries.

17) The number of new cavity lesions is significantly smaller in the age group 6-11 when the salivary calcium values increased to the age group12-14 years when the pH of the saliva is increased and the age group 15-18 years when the salivary phosphates are raised.

18) Ensuing the evaluation at 12 months, the incidence of newly formed caries increased in female patients, group age 15-18. However in November the number of patients with carious lesions decreased significantly from the first two examinations.

19) Both females and males maintain statistically significant differences for each salivary parameter between the patients with new caries lesions and those without carious lesions for each age group and the group as a whole.

20) The values of calcium, phosphate and salivary pH have increased since the profilactico-curative treatment, as compared with the values obtained from the initial examination and the one recorded at 6 months. The Parameter values increase significantly after the three successive evaluations only in males of the age group 6-18 years.

21) In females, for the age group 6-18 years, salivary pH increases significantly after the three successive evaluations and significantly decreases the number of carious lesions for the entire group of patients studied.