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THE USE OF HERBS WITH SYMPATHOLYTIC QUALITY TO INCREASE PROTECTIVE AND MINERALIZING PROPERTIES OF SALIVA IN CHILDREN OF PRIDNEPROVSK INDUSTRIAL REGION

ЗАСТОСУВАННЯ РОСЛИННОГО ЗАСОБУ В ПІДВИЩЕННІ ЗАХИСНИХ І МІНЕЛАЛІЗУЮЧИХ ВЛАСТИВОСТЕЙ СЛИНИ У ДІТЕЙ ПРИДНІПРОВСЬКОГО ІНДУСТРІАЛЬНОГО РЕГІОНУ

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Abstract. *Problem of dental caries prevention and treatment is the most actual in the scientific and practical modern dentistry. One of the main aims in that question is possibility to increase of resistance tooth enamel to caries. It is known that a natural buffer capacity and capability of saliva "improves" the tooth enamel stability during maturation, when the stage of secondary mineralization occurs. The main role in this process belongs to proteins of oral liquid; their optimum ratio contributes the saturation of the tooth enamel by calcium ions. The state of the hard tissues of teeth and the protein composition of saliva in children with the prevalence of the sympathetic nervous system tone were investigated. It is noted that with sympathotonia, the intensity of caries is higher compared to normotonium, while the number of proteins rich in proline (PRP) involved in mineralization and protection of enamel is significantly reduced. In order to prevent dental caries in children with sympathotonia, a sympatholytic effect of 5% of peppermint infusion is proposed, both inside and in the form of rinses.*

Key words: *saliva, sympathotonia, proline-rich proteins, caries prevention, menthe piperita.*

Introduction

In publications of the last decades, devoted to investigations of nervous system influence on appearance of stomatological diseases, some data are presented that underline the correlation between the domination of part of autonomic nervous system and the state of solid teeth tissues *[3;4;5;7]*. The domination of sympathetic nervous system may be either a temporary and accidentally caused state of the organism of the result of action of different stressors – such as aggravation of the environment or a low level of living conditions with obvious presence of negative emotions, or a steady, intensive flow of information, etc. *[2]*. Children react on stressors more energetically and longer than adults. This fact is stipulated by the stipulated by the peculiarities of nervous system of a growing organism *[1]*.

According to leading neuropathologists' data, sympathotonia as a corresponding reaction of an organism on prolonged negative actions is not always useful for the organism *[17]* and especially for a growing one. All these factors lead to rebuilding of organs and systems and to the change of their functions. It is well known that salvia with its properties and composition plays an important role in the pathogenesis of dental caries *[6,9,12]*. Cariostatic action of salvia is revealed in the cases of

domination of parasympathetic part of uniform tonus of both parts of autonomic nervous system *[3,4]*. The viscosity of salvia in these conditions is to be optimal, velocity of salvia secretion – necessary for secretion, so is to be necessary for synthesis of proteins that take part in protection and mineralization of enamel *[11,14]*.

Subjects and methods.

For the last several years some publications on proline-rich proteins (PRP) have appeared. Is is known, that PRP are synthesized and localized in spherical structures of secretory granules of salvia glands. After getting to oral cavity they take part in creation of pellicle *[14]*, inactive growth of oral streptococcus *[18]*, assist calcium to penetrate into enamel *[16]*and ensure stability of hydroxyapatite in surface layers of enamel *[15]*. The dominant role of parasympathetic nervous system in mechanisms of PRP is widely known *[10]*. As domination of sympathetic system on the whole, even under parasympathetic manifestation in some separate peripheral links leads to complete sympathotonia under different negative influences *[2]* that lasts longer in children's organisms *[1]* it is natural to suppose, that negative factors may influence on secretory functions of salvia glands, that will lead to increase sensitivity of teeth to caries. We have found no information on detailed investigations concerning the state of hard tissues and properties of salvia of children with sympathotonia. Neither have proteins of salvia been investigated. Dynamics of secretion and protein synthesis in cases of increased tonus of sympathetic nervous system are not known as well. Simple methods of correction of properties of salvia with the purpose to normalize its mineralizing ability in the cases of sympathotonia haven't become the object of scientific analysis. Thus, all the problems mentioned above have become the object of the present investigation. 253 children became the object of investigation. They were practically divided into two groups according to the scheme of O.M. Wein (197) and D. Becar (1970). The first group consisted of 105 children with well-balanced autonomic nervous system. The second group consisted of 148 pupils with domination of sympathetic part of nervous system. Stomatological status was investigated according to recommendations of World Health Organization (WHO). Clinical evaluation of rate of enamel remineralization were made according to T.Redinova at all, 1982. Dynamics of proline-rich proteins was investigated by ion-exchange chromatography and SDS-electrophoresis.

Results.

Examination of children with well-balanced type of autonomic nervous system with sympathotonia have shown that the latter individuals had broader and more intensive dental caries (58.1 ± 4.82%) and 91.9 ± 2,24%; 3.76 ± 0.31 and 4.61 ± 0.18 respectively).

Reliable changes under sympathotonia were discovered in Clinical Evaluation of Enamel Remineralization Velocity (CEERV) test data. In the test group it was 4.62 ± 0.11, while the control was 2.67 ± 0.29.

The content of PRP was much lower in the test group in comparison with the control (4.79 ± 1.1 mg %, 13.53 ± 1.57 mg %).

The data obtained gives us the possibility to conclude that children with sympathotonia had saliva with much lower protective and mineralizing functions that

makes them subject to caries very much.

The organism of child may adapt in the process of growing to some stressors that might be reflected on oral liquid state. But in early childhood children's teeth are sure to be affected by caries in the group of children with sympathotonia.

The conclusion drawn of the whole range of fundamental investigations *[8]* is as follows: there is a possibility to train saliva glands, their secretion activity by influence on autonomic nervous system. Thus, several methods were elaborated to improve the state of saliva composition of the children from the test main group. The originality of the method consists in application of a wide spectrum of biological activity of peppermint (mint) in respect of its sedative, sympatholytic and stimulating properties. The properties of this plant have not been used in the sphere of children's stomatology.

To investigate the specific properties of this herb two groups of children with sympathotonia were organized. The first, control group consisted of children of 6-8 years old, who followed the generally accepted methods of oral hygiene. They cleaned their teeth with a toothbrush and toothpaste every day in the morning after getting up and in the evening after meals.

The second, experimental group, consisted of students 6-8 years old, who besides individual oral hygiene used 5% infusion of peppermint (Mentha piperita), calculated the following such way: 3-4ml per 1 kg of a child's weight twice a week and rinsed their teeth with this solution every day after dinner and breakfast during one month. The course of application of the method consisted of 6 cycles with 0.5 year recess.

Conclusions.

The results of the investigations performed make it possible to conclude that the use of 5% infusion of mint leads to the reliably increase of secretory and synthetic ability of salivary glands. Thus, after the accomplishment of the above described course the concentration of proline in saliva of the experimental group was 10.48 ± 1.63 ($p<0.05$), while in the control group it was 5.40 ± 1.42 ($p<0.05$). At the beginning of the course these data were 3.88 ± 0.76 and 5.82 ± 2.25 respectively. Simultaneously the intensity of caries in the control group changed from 0.68 ± 0.12 to 2.70 ± 0.20 and in the last case was 45.1%.

Index of CEERV test confirmed the increase of mineralizing ability of saliva in the experimental group too. Thus, if in the experimental group it changes form 4.79 ± 0.17 to 2…70 ± 0.16 ($p<0.05$), in the control group the index didn't change (from 4.19 ± 0.22 to 4.03 ± 0.23, $p>0.05$).

Diagnosis of caries and the possibility to forecast its appearance have become very important recently. The results obtained from the above-described investigation give the possibility to consider PRP as a informative index of enamel resistance to caries and domination of sympathetic nervous system as a risk factor of caries appearance.

Thus, the analysis of the obtained results enables us to speak about the discovery of some unknown sections of caries pathogenesis. This treatment may provide the increase of dental enamel resistance to caries.

As far the application of peppermint infusion is concerned, it is possible to

underline high efficiency of action of this plant on biophysical properties of saliva and caries-resistance of dental enamel for children with domination of sympathetic nervous system.

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Анотація. *Проблема профілактики та лікування карієсу зубів є найбільш актуальною в науковій та практичній сучасній стоматології. Підвищення ступеня резистентності емалі зубів до карієсу – одне із завдань первинної стоматологічної профілактики. При цьому значну роль надають природній буферній ємкості та спроможності слини «покращити» емаль зубів в період дозрівання, тобто на етапі вторинної мінералізації. Головна роль в цьому процесі належить білкам ротової рідини, оптимальне співвідношення яких сприяє насиченню емалі зуба іонами кальцію. Досліджувався стан твердих тканин зубів і білковий склад слини у дітей з превалюванням тонусу симпатичної нервової системи. Відзначено, що при симпатотонии інтенсивність карієсу вище в порівнянні з нормотонією, тоді як кількість білків, багатих пролином (ББП), що беруть участь в мінералізації та захисту емалі, достовірно знижена. З метою профілактики карієсу зубів у дітей з симпатотонією запропоновано симпатолітичну дію 5% настою м'яти перцевої, при застосовуванні як внутрішньо, так і у вигляді полоскань.*

Ключові слова: *слина, симпатотонія, білки багаті на пролін, профілактика карієсу, м'ята перцева.*

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