DETERMINATION OF MICROBIOLOGICAL INDICATORS OF CHANGES IN DENTAL HARD TISSUE UNDER THE INFLUENCE OF CARBOHYDRATES IN CHILDREN.

Mamadiyorova Adolat Shuxratovna

Tashkent State Medical University

mamadiyorovaadolat@gmail.com

https://orcid.org//0009-7289-1496

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ABSTRACT

The amount of oral fluid sediment was determined by the weight method. Upon receipt of the oral fluid sediment, its qualitative characteristics were organoleptically evaluated: color, viscosity, and odor. To determine the content of calcium and phosphorus, as well as their ratio (Ca/R coefficient), the precipitate was prepared and studied according to the method of V.G. Shirobokova. The utilization activity of the oral fluid precipitate was determined by the degree of pH change during incubation of the precipitate with 0.28 M glucose solution at t = 37 ° C for 3 hours. The demineralizing ability of the oral fluid sediment was estimated by the amount of calcium extracted by the sediment from the enamel of an intact human tooth prepared according to the method of V.K. Leontiev.

Currently, the leading role of microflora in the etiology of dental caries is considered proven. The intake of easily fermentable carbohydrates and poor oral hygiene contribute to the active course of this disease. At the same time, clinical observations show that the intensity of caries is often minimal in people who have not carried out regular dental hygiene and consume large amounts of carbohydrates. Thus, the intensity of the carious process cannot be explained solely by the effect of adverse factors of the oral cavity on the tooth enamel. A number of authors point to the important role of dental resistance in the pathogenesis of caries [2,9].

We believe that dental resistance is a powerful factor that determines the degree of enamel resistance to adverse local influences that create a cariogenic situation in the oral cavity. It is the resistance of tooth enamel that determines the prognosis of the development and course of caries in various people[6,11].

When selecting the observation group, individuals with lesions of the hard tissues of teeth of non-carious origin, as well as orthodontic pathology, were excluded. There was no history of chronic diseases or taking any pharmacological drugs.

Before starting a massive local carbohydrate load, all these people were subjected to a thorough dental examination, which was conducted according to a specially developed program[5,8].

During the dental examination, generally accepted methods were used (medical history, examination, probing, and, if necessary, X-ray examination). Special attention was paid to the exclusion of foci of enamel demineralization, which were detected using a 2% aqueous solution of methylene blue [1]. The periodontal condition was assessed using the PMA index in the Parma modification [20]. In addition, the oral hygiene indices (IGG-Y) were determined for all subjects using the Green, Vermillion method [25], according to the method of Yu.A. Fedorov and V.V. Volodkina [20] and the plaque caries index according to the Hardwick and Manley method [26]

modified by V.B. Nedoseko coauthor [15]. The KOSRE test was determined according to the method of T.L. Redinova et al. [13].
In addition to the condition of the teeth, periodontium, and oral mucosa, the composition and properties of oral fluid and sediment, as well as the functional activity of the salivary glands, were studied. To study the effect of oral fluid as the environment surrounding teeth on the organs and tissues of the oral cavity, mixed saliva was taken from the subjects on the day of the experiment and on the day of its completion (after 23 days). Saliva sampling was performed in all cases only in the morning on an empty stomach[6,8].
The saliva was examined within an hour after sampling. The saliva was centrifuged for 30 minutes at 8000 rpm before analysis. at room temperature. Calcium and phosphorus were measured in the sedimentary fluid according to the method of V.K. Leontiev [10], and pH, pNa, pK, and pCa were potentiometrically determined using ion-selective electrodes on an EV-74 potentiometer and an OP2/208/01 pH meter. The hygiene index for Green, Vermillion [25] was 7.00±0.04 points on average for the examined group of caries-resistant individuals. Thus, characterizing the index of oral hygiene (IGG-Y), we can state a significant increase in its values at the final stage of the study compared with the initial 2.07±0.13 points ($p<0.001$). The hygiene index values according to Yu.A. Fedorov and V.V. Volodkina [20] also increased significantly: from 1.38 ±0.12 to 4.03 ± 0.10 points ($p<0.001$). Thus, the oral hygiene indices have significant differences between the first and 23rd day of the study ($p<0.001$). When determining the cariesogenicity of plaque, it turned out that the values of the studied indicator increased compared to the baseline level (before the carbohydrate load was prescribed) and also have a high degree of reliability of differences[3].
The largest amount of plaque was localized on the vestibular surfaces of the teeth, in the cervical region and in the interdental spaces, and on the molars of the upper and lower jaws - and from the oral surfaces. The color of the plaque varied from dark yellow to brown. Dense in consistency, it was perceived subjectively as a rough film. On the 23rd day of the local carbohydrate load, 7 people had no dental plaque caries on all groups of teeth; In five cases, there was a weakly positive reaction to methylene red on the teeth of the anterior quadrant, upper premolars and lower molars; and on the lower premolars and upper molars - positive. In only two cases, there was a positive cariesogenicity of plaque on the group of chewing teeth (molars, premolars) of the upper and lower jaws, weakly positive on the teeth of the anterior group of the lower jaw and negative on the incisors and canines of the upper jaws. It should be noted that before the start of the local carbohydrate load, a negative plaque reaction to cariesogenicity in all groups of teeth was observed in 10 out of 15 people surveyed, in two, plaque cariesogenicity was weakly positive only on the lower molars. We noted a positive reaction to cariesogenicity (3 points) in only three cases[3,8].
On the 23rd day after the start of the application of a massive local carbohydrate load and the determination of dental hygiene and cariesogenicity indices, the teeth were carefully examined for the dynamics of the main indicators of tooth enamel and periodontal disease during a massive local carbohydrate load and in the absence of hygienic care. The calcium-phosphorus coefficient was calculated from the obtained data on calcium and phosphorus.
The amount of oral fluid sediment was determined by the weight method. Upon receipt of the oral fluid sediment, its qualitative characteristics were organoleptically evaluated: color, viscosity, and odor. To determine the content of calcium and phosphorus, as well as their ratio (Ca/R coefficient), the precipitate was prepared and studied according to the method of V.G. Shirobokova [22]. The utilization activity of the oral fluid precipitate was determined by the degree of pH change during incubation of the precipitate with 0.28 M glucose solution at t = 37 ° C for 3 hours. The demineralizing ability of the oral fluid sediment was estimated by the amount of calcium extracted by the sediment from the enamel of an intact human tooth prepared according to the method of V.K. Leontiev [10].
We investigated the functional activity of the salivary glands during the creation of a controlled cariogenic situation in the oral cavity of individuals with a high level of enamel resistance. A number of quantitative and qualitative parameters of the oral fluid were studied before and after

stimulation of the salivary glands with a 4% citric acid solution applied to the back of the tongue in an amount of 2 drops [10]. The functional activity of the salivary glands was assessed by the amount of saliva secreted before and after stimulation, the rate of secretion, changes in the content of calcium, phosphorus, their ratio (Ca/R), pH, and active concentrations of electrolytes (Na, K)[1,5].

Thus, when planning the study, we considered it necessary to consider some indicators of tooth enamel and oral fluid that could change with a massive local carbohydrate load and cause the development of the carious process.

The results of the study and their discussion. With a massive local carbohydrate load (daily nine-fold rinsing of the oral cavity with 50% sucrose solution and exclusion of hygienic care), the following changes were observed on the part of the teeth and oral mucosa. Subjectively, all the subjects noted saliva viscosity, dry mouth, burning sensation in the mucous membrane of the oral cavity and tongue on 3-4 days after the start of rinsing. There was a constant feeling of thirst. By the end of the first week, many people had decreased their appetite and temporarily lost their taste orientation[3,5].

By the time the massive local carbohydrate load ended (on the 23rd day), 15 subjects had massive, almost 3/4 tooth crown-grabbing, pigmented teeth on the teeth of all functionally oriented groups, the values of the studied indicators were studied before and after the creation of a cariogenic situation, after which the enamel was re-stained with a 2% aqueous solution of methylene blue, carefully examined and the KPU index has been determined. It is important to note that the value of this index in the group of caries-resistant individuals did not change after the withdrawal of carbohydrate loading and was equal to zero, as before it began. Consequently, when creating conditions favorable for the development of caries in the oral cavity, the tooth enamel of caries-resistant individuals turned out to be resistant to adverse environmental factors and caries did not occur[2,8].

In the course of this study, we studied the effect of local adverse factors on the condition of periodontitis and oral mucosa.

The effect of lack of oral hygiene was studied as local adverse factors using the classical Fehretal (1970) method using a local carbohydrate load with a sucrose solution of 50% concentration. All the subjects who stopped brushing their teeth and rinsed their mouths with sucrose solution had swelling and hyperemia of the gingival papillae, that is, symptoms of catarrhal gingivitis. With light probing of the marginal and papillary gums, bleeding occurred, which can be estimated at 3-4 points on the bleeding index. The values of the PMA index increased significantly[3,5].

After the end of a massive local carbohydrate load, the indices of this index were 92.79±1.46%, compared with the initial 20.95±2.94% ($p<0.001$). Thus, the lack of hygiene and the massive local carbohydrate load did not lead to the realization of caries in caries-resistant individuals. However, previous studies have found that under similar conditions, an increase in new carious cavities is observed in caries-exposed individuals [15]. Therefore, it can be assumed that this fact is due not to the force of exposure to adverse factors of the oral cavity, but to the properties of the enamel and oral fluid of the subjects.

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