



Modern Basics of Diagnosis and Prevention of Caries in Adolescents

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Abstract: Relevance. Caries in adolescents is a multifactorial infectious disease that can develop at any age of the patient (at an early age, in adolescence and in adults) throughout life, leading to the demineralization of enamel with the formation of a carious cavity. Caries remains a significant problem in most developed countries of the world, affecting from 60 to 90% of schoolchildren and the vast majority of the adult population. Dental caries is most common in Asian and Latin American countries, where the incidence of children and adults is approaching 100%.

Dental caries averages 2.5 (CPI index), with a prevalence of more than 80%. Risk factors for the development of caries. The main risk factors for the development of caries are: the role of cariesogenic microorganisms of the oral cavity (*Streptococcus Mutans*, *Lactobacilli*, et al), nutrition with a predominance of easily digestible carbohydrates, changes in the properties and composition of saliva, socio-economic level of the family, dentist attendance and others. In addition to cariesogenic factors that constantly and continuously affect the hard tissues of the teeth, leading to the demineralization of enamel, there are protective mechanisms (composition and properties of saliva, fluorides) that can shift the balance towards the remineralization process. Thus, the carious process can be stopped and even reversed if the integrity of the hard tissues of the teeth is preserved [2.4.6.8].

Clinical studies prove that the level of oral hygiene plays a significant role in the development of dental caries. Plaque is a complex biofilm that forms over time on the enamel surface, especially in areas that are difficult to reach for a toothbrush (contact surfaces of teeth, neck area), as well as on the mucous membrane of the soft tissues of the oral cavity (tongue back, cheek mucosa, alveolar processes). It is proved that up to 1000 species of microorganisms are colonized in the thickness of plaque, depending on its maturity and localization. The specific composition of microorganisms in the dental biofilm depends on its location (hard tissues of the teeth or mucous membrane).

Thus, a decrease in the pH value below the "critical" leads to the leaching of calcium and phosphates from the enamel crystal lattice and the development of demineralization of hard tooth tissues. The process of caries development consists in shifting the balance between cariesogenic and protective factors: if cariesogenic factors prevail in the oral cavity, then the process of demineralization dominates, if protective, then remineralization is triggered and the development of caries stops. Alternation of cycles of de- and remineralization can occur for a long time before reaching the "end

point" – the formation of a carious cavity. The fact that the development of dental caries is a dynamic process and reversible at the initial stages is of particular importance in the treatment and prevention of caries, and early diagnosis of lesions allows for timely prevention and treatment of focal demineralization. The topic of caries detection at the earliest stages of development is currently receiving a lot of attention. To replace the traditional visual diagnostic methods (drying, vital staining), researchers around the world are increasingly using modern international criteria for assessing the degree of carious lesion.

Prevention of caries that dental caries is a dynamic and reversible process, underlies the prevention of caries. Fluorides have been used for the prevention of caries for more than 70 years. Numerous clinical studies have proven that fluorides stabilize demineralization and accelerate the process of remineralization of hard tissues of teeth. The WHO Expert Committee confirms the importance of regular oral hygiene with the use of fluoride-containing drugs to maintain oral health at the population level. The use of endogenous and exogenous methods of prevention of dental caries significantly reduces the growth of caries. According to WHO, fluoridation of drinking water reduces the prevalence of dental caries by 15.0%, the use of fluoride-containing toothpastes and mouthwashes reduces the increase in caries by 24-26%. Fluoride ions contribute to the incorporation and retention of calcium and phosphate ions in the enamel structure, forming the compound fluorapatite, which is more resistant to acids than tooth enamel. At the same time, there is no reliable data that the use of fluorides harms the body [1.3.5.7.9].

Toothpastes depend on age, the degree of risk of caries, the concentration of fluoride in water in a given region, which is important to reduce the likelihood of fluorosis. Regular daily oral hygiene remains the most accessible and widespread method of fluoride prevention at the mass level. Despite the fact that the vast majority of toothpastes for adult patients on the market are fluoride-containing, the intensity and prevalence of caries is still high.

The study revealed a low level of compliance of parents of young children (n=596), since only half of the interviewed mothers (a standardized indicator of 49.5%) carried out the necessary hygienic dental care for their babies. Consequently, every second child aged 4-35 months did not receive the necessary hygienic dental care. In the course of the study, low compliance of parents of children of the first and second years of life was registered, for whom oral hygiene after teething was carried out only in 23.3% and 35.4% of cases, respectively; most children (89.8%) began to receive dental hygiene only after two years, only 16.9% of mothers carried out oral hygiene for babies with using pastes with fluorides [10.12].

Effective and safe concentrations of fluorides in toothpastes for the prevention of dental caries in adults, prove the high effectiveness of double daily oral hygiene with fluoride-containing oral hygiene products with a fluoride concentration of at least 1000 ppm, compared with fluoride-free toothpastes. Toothpastes with a higher concentration of fluoride (1500-5000 ppm) are recommended for patients with a high risk of developing caries. Hygiene products with a low fluoride content (500 ppm) are prescribed to children under 6 years of age in order to prevent and balance the risk of caries and the risk of fluorosis. Numerous studies prove that the incidence of dental caries correlates with a low level of oral hygiene and poor-quality brushing of teeth. It is argininolytic bacteria that break down arginine to an ammonium base, which is able to neutralize plaque acids and stabilize the microbial balance of dental biofilm [4]. Thus, increasing the pH of plaque creates a favorable environment for stopping demineralization and starting remineralization, preserving the ecological balance in the microbial biofilm and providing it with a "healthy microflora" [11.12].

A study of toothpaste with 1.5% arginine in combination with calcium carbonate without fluoride (study group) and toothpaste with 1100 ppm NaF/silicon dioxide (control group) with the participation of 11-12-year-olds showed the same effectiveness of arginine and fluoride-containing toothpastes in

reducing the growth of caries. This clearly indicates that the effect of arginine-containing toothpaste on reducing the cariesogenicity of plaque leads to clinically pronounced benefits for the prevention of caries. A number of clinical studies involving patients who used arginine containing toothpaste (study group) showed that in the study group the pH of plaque was significantly higher than in the control group, where patients used toothpaste with 1100 ppm fluoride. An increase in the pH of plaque occurs due to the splitting of arginine and the formation of an ammonium base, which leads to the neutralization of the acidity of plaque, and calcium and fluoride, which are part of the toothpaste, participate in the process of remineralization of hard tissues in an environment safe from cariesogenic acids [9.11.12].

Conclusion. The diagnostics of caries in the early stages of QLF showed that the use of toothpaste with 1.5% arginine, 1450 ppm fluoride and insoluble calcium compound (study group) more effectively stabilizes demineralization and stimulates remineralization of hard tissues of teeth compared with pastes containing only 1450 ppm fluoride (control group). The analysis of the volume of initial carious lesions (ΔQ) after 6 months of using arginine-containing toothpaste was 44.6% less than during the initial examination, while in the control group ΔQ was 28.9% less than during the initial examination, respectively. The difference in indicators between the new oral hygiene product and positive control was statistically significant.

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