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Principles of Pathogenetic Therapy of Early Childhood Caries

Radjapova Fotima Rustambek Qizi
Urgench Branch of Tashkent Medical Academy

Relevance of the study. After ingestion of carbohydrates, especially sucrose, the pH in biofilms adhering to teeth drops rapidly to 5.0 or lower. A lower pH leads to a so-called dysbiotic microbiome, which is characterized by an increase in the proportion of acidic biofilm species and changes in the composition of the biofilm matrix. Thus, frequent exposure to sugar leads to sustained acid production and subsequent demineralization of the tooth structure. The colonization of the oral cavity of children by microorganisms occurs through both vertical and horizontal transmission. The transmission of microorganisms, however, should not be considered synonymous with the transmission of caries, since bacteria alone are not enough to develop the disease. For this reason, dental caries is considered a non-communicable disease. Biofilm alone does not produce disease, but exposure to dietary sugars is a determining factor, as well as a person's ability to overcome environmental problems. RDC shares risk factors with other non-communicable diseases, such as cardiovascular disease, diabetes, and obesity. Dental caries develops when plaque, a polymicrobial biofilm, is not regularly removed, and the diet consists mainly of monosaccharides. Monosaccharides can be metabolized by many oral bacteria, which leads to increased production of acids capable of demineralizing The enamel. Plaque builds on top of the biofilm, starting immediately after mechanical removal of the film. More than 700 bacterial species/taxa are known in the oral cavity. Since the oral habitat consists of many different ecological niches, this may explain the relatively high number of different species/taxa. The microorganisms of the oral cavity are able to interact with each other and mainly communicate using the so-called "quorum sensing" (CC). It is now well known that not only bacteria, but also fungi such as Candida albicans and their interactions can enhance the progression of caries. However, microorganisms grown by polyamide biofilms are capable of producing exopolysaccharides (EPS), as well as extracellular polymeric substances. With the help of EPS, microorganisms are able to resist antimicrobial drugs that have recently been used in toothpastes. Consequently, biofilm formation is not interrupted and, together with absorbed saccharides from food, leads to cariogenic plaque. The consumption of free sugars (i.e. sugars added to food and beverages and sugars naturally present in honey, syrups, fruit juices and fruit juice concentrates) is crucial in the development of tooth decay.

Some cohort studies have shown that two key characteristics are crucial for the development of RDC: the age at which a child consumes sugar and the frequency of its consumption. As for the introduction of sugar, the diet at an early age, characterized by a large number of highly sweetened foods and beverages in the first year of life are closely related to the incidence of childhood caries

in subsequent years. Plaque is found on the enamel of children and consists mainly of streptococcus and actinomycetes. With a low-sugar diet, these microorganisms live as commensals in a homeostatic environment, controlling each other. As soon as the consumption of sugars, especially sugary foods and drinks increases, the microbiota of the commensal plaque will absorb them. RDC is an aggressive form of dental caries characterized by severe infection with streptococcus mutans (Str. mutans), which sometimes exceeds 30% of the cultivated plaque flora, biofilms (according to a review. In general, two types of MS are found in human lesions: Streptococcus mutans (serotypes c, e, f, and k) and, more rarely, Streptococcus sobrinus (serotypes d and g). However, the level of MS in plaque varies depending on the stage of caries development, although other microorganisms may be associated with the disease. Although an acidic pH is undoubtedly the direct cause of tooth enamel dissolution, the environment in which acid is produced and retained on the tooth surface, i.e. the biofilm matrix, is equally important, especially if there is sufficient buffered saliva capable of neutralizing acids in tooth enamel. Dietary sugars are one of the most important mediators in the pathogenesis of ECC. Sucrose is the most cariogenic among them, as it serves as a substrate for the production of acid and exopolysaccharides by microorganisms, contributing to the initiation and accumulation of cariogenic biofilms (Paes-Leme et al., 2006). Children suffering from RDC were often allowed to engage in prolonged consumption of dietary sugars in the anamnesis. This includes practices such as filling sugary drinks (i.e. soft drinks and honey) in a drinking cup for oral administration during the day or in a feeding bottle that is not touched in the baby's mouth at night, which contributes to the rapid onset and progression of carious lesions.

The results of animal studies, systematic reviews, and microbiome-based approaches have revealed a clear role of multiple sclerosis in the etiology and pathogenesis of dental caries, as well as their relationship to dental caries. Multiple sclerosis has an extraordinary ability to infect and colonize teeth and promote the development of cariogenic biofilms in the presence of sucrose. Infants become infected with multiple sclerosis as a result of vertical transmission through the oral cavity of their caregivers, as well as through horizontal transmission from others in their immediate environment.

Conclusion. Interestingly, early acquisition and colonization of RDC (i.e., before the age of 3) led to higher levels of oral MS and the decaying-absent fields index (DMF) at the age of 19, indicating the importance of combating infection with these bacteria in the oral cavity in young children.

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