AJPMHS GLOBAL RESEARCH NETWORK

AMERICAN Journal of Pediatric Medicine and Health Sciences
Volume 2, Issue 6, 2024 ISSN (E): 2993-2149

Risk Factors for Caries in Children

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Abstract: Cariesogenic factors can be of different intensity and nature, different variants of their interaction contribute to the occurrence of caries, but the leading factor is the microflora of the oral cavity.

Keywords: carious process, cariesogenic factors, oral cavity, microflora, teeth, prevention and treatment of dental caries.

Currently, it is known that the carious process can develop in the presence of microorganisms in the oral cavity, excessive amounts of carbohydrates in food and contact of carbohydrates and microorganisms with tooth enamel. It is well known that the intake of carbohydrates causes increased acid formation. So, taking 10 grams of sugar leads to an increase in lactic acid in saliva by 10-16 times.

Studies have shown that at a pH of more than 6.2 acidic, saliva from being oversaturated with hydroxyapatite becomes undersaturated, therefore, it turns from mineralizing to demineralizing (destroying hard tooth tissues) liquid. According to modern ideas, the cause of caries is prolonged exposure to acids on dental tissues. The formation of organic acids is associated with the long-term enzymatic activity of microorganisms. Prolonged exposure to organic acids on tissues is observed with poor oral hygiene, when a plaque forms on the enamel, it is under it that an acidic environment is created as a product of the enzymatic activity of a huge number of microorganisms capable of ideally absorbing carbohydrates that have lingered in the oral cavity. Thus, a carious cavity is formed in places of intense acid production, under the dental plaque, where the pH is more acidic than 4-5. With good washing of teeth with oral fluid, rare sugar intake, the local pH shift is quickly leveled.

However, in areas of poor saliva access, with frequent intake of sugar, the process of demineralization may prevail over the process of remineralization. This means that the consumption of carbohydrates can be a decisive factor in the pH shift and disruption of mineralization processes, which leads to the appearance of caries. It should be noted that the action of general factors is carried out, as a rule, through the action of local ones. That is, diet, the state of organs and systems, extreme situations can change the composition and properties of oral fluid, affect the microflora of plaque and plaque. Sugar has a specific effect on metabolic processes in the oral cavity, causing a "metabolic explosion" after taking it. This effect of simple carbohydrates is due to their willingness to enter into metabolism (i.e. metabolism) already in the oral cavity, unlike proteins, fats and complex carbohydrates, which require preliminary hydrolysis: swelling and activation. The conditions for the absorption of carbohydrates by the oral microflora are close to ideal. This naturally affects the intensity and prevalence of caries. So, according to modern views, the immediate cause of the progressive demineralization of hard tooth tissues (caries) are organic acids, the formation of which is associated with the long-term

enzymatic activity of microorganisms. The occurrence of caries is the final stage of the effective interaction of a number of cariesogenic factors.

It is known that at a young age, the intensity of tooth decay is higher than in the elderly. This is due to the insufficient mineralization of the tooth enamel immediately after its eruption. Enamel maturation lasts for more than two years, and only full-fledged mineralization causes greater resistance of tooth enamel to acids, and vice versa, insufficient mineralization creates conditions for rapid demineralization and the occurrence of a carious process. After teething, the enamel initially matures in the area of the cutting edges and tubercles of all teeth, therefore, the carious process occurs precisely in the immature fissures and the cervical region, which belong to the risk zones.

Today, the problems of maturation are central to the prevention and treatment of dental caries. Oral fluid plays a huge role in the formation of enamel, the remineralizing ability of the latter has been proven in a number of clinical and experimental studies. Normally, demineralization processes in the oral cavity are in a state of dynamic equilibrium, however, in the presence of cariesogenic factors, a shift in equilibrium towards demineralization is observed. The state of reduced resistance of dental tissues to cariesogenic effects as a result of a violation of the nonspecific resistance of the body due to past and existing somatic diseases.

A cariesogenic situation is created when any cariesogenic factor or a group of them, acting on a tooth, makes it susceptible to the effects of acids. Of course, the trigger mechanism is the microflora of the oral cavity with the obligatory presence of carbohydrates and the contact of these two factors with the tissues of the tooth. In conditions of reduced resistance of dental tissues, the cariesogenic situation develops easier and faster. Clinically, the cariesogenic situation in the oral cavity is manifested by the following symptoms:

a) poor oral hygiene;

b) abundant plaque and tartar;

c) the presence of multiple chalky carious spots;

d) bleeding gums.

However, even in regions with a high prevalence of caries, there are people who do not have this disease, which made it possible to identify a group of caries-resistant individuals (resistant to caries). At the same time, there are people whose intensity of dental caries damage significantly exceeds the average group level, such people were identified as caries-susceptible. Caries resistance and caries susceptibility should be considered in terms of their relationship, as well as cariesogenic factors (general and local) they can be of different strengths. The occurrence of caries is possible with various variants of their interaction. In caries-susceptible teeth, the pathological process occurs faster and more often, which depends on the general condition of the body in the past.

Common diseases associated with caries in this period of time cannot affect the structure and composition of mature teeth, however, a violation of the functional state of organs and body systems actively affects the occurrence and course of the carious process, changing the composition and properties of the oral fluid. The factors of resistance and susceptibility to caries are the result of certain relationships between the tooth surface and oral fluid. If, during progressive demineralization, cariesogenic factors lose their power or disappear, it is possible to suspend demineralization. The occurrence of caries is caused by many factors, and if appropriate conditions are present, they become the cause of the disease. Dental caries resistance is formed in individuals who are not burdened by past and chronic concomitant diseases and their consequences, who eat full-fledged food and water, contain the necessary macro- and microelements, and are not exposed to any harmful effects. Each of the following factors depends on the general condition of the body, its reactivity and resistance.

Dental caries resistance, or caries resistance, is ensured:

- the chemical composition and structure of enamel and other tooth tissues;
- the presence of a pellicle;
- the optimal chemical composition of saliva and its mineralizing activity;
- a sufficient amount of oral fluid;
- low permeability of tooth enamel;
- good chewing load and self-cleaning of the tooth surface;
- properties of plaque;
- good oral hygiene;
- features of the diet;
- proper formation of the rudiments and development of dental tissues;
- timely and full-fledged enamel maturation after teething;
- specific and non-specific factors of oral cavity protection.

The susceptibility of teeth to caries, or caries susceptibility, is facilitated by:

- incomplete enamel maturation;
- a diet with a deficiency of proteins, macro- and microelements, and an excess of carbohydrates;
- water with insufficient amount of fluoride - absence of pellicle;
- the composition of the oral fluid, its concentration, viscosity, amount and rate of expiration;
- the biochemical composition of the hard tissues of the tooth, which determines the course of caries, since the dense structure with minimal spaces of the crystal lattice slows down the course of caries and vice versa;
- the condition of the neurovascular bundle;
- the functional state of organs and body systems during the formation and maturation of tooth tissues;
- improper tooth development due to common somatic diseases.

The carious process progresses if the rate of salivation decreases, the amount of saliva decreases, its viscosity increases and, conversely, the carious process slows down or stops at the stain stage with a sufficient amount of saliva and its normal viscosity. A high concentration of macro- and microelements in saliva also suspends caries, with a low concentration of mineral elements and a high content of mucin, its progression is observed. Thick, smooth enamel, its dense structure and minimal crystal lattice spaces slow down the course of the carious process.

Pits, grooves, folds, depressions, thin enamel and loose structure contribute to the rapid progression of the pathological process. In many cases, dental caries occurs in immature fissures, which are risk zones, the latter also include the cervical areas of the teeth. The rapid maturation of tooth enamel occurs in the area of cutting edges and bumps within 4-6 months after their eruption. It is especially intense in the first days and weeks after teething. The enamel of the cutting edge of the incisors and canines ripens 2 times faster than in the cervical region. The rate of maturation of the enamel of the fissures of teeth is much slower than the bumps and cutting edges, and largely depends on the degree of washing of the teeth with saliva and closing the fissures with plaque. An important fact for practice has been established that in all cases the full maturation of the fissures of premolars and molars varies in terms of up to 2 years.

At the same time, in many cases, dental caries occurs in immature fissures and their destruction begins. The main sign of age-related changes in enamel is compaction and a decrease in structural variability due to a decrease in microporosity, which is consistent with the results of studies on changes in calcium and phosphorus content during enamel maturation. Enamel compaction is a consequence of the intake of macro– and microelements that change the chemical composition of enamel, its structure, and properties (an increase in microhardness, a decrease in solubility and permeability occur simultaneously). These facts also explain that at a young age, the increase in the intensity of tooth decay is higher than in the elderly. With age, the number of people with a high level of resistance decreases among both men and women, mainly people with medium and low levels of resistance predominate, however, there are significant group differences for each level of resistance in terms of hygiene index, saliva secretion rate, enamel remineralization rate, etc. The elimination of the cariesogenic situation is associated with the remission of a general somatic disease, the resumption of oral hygiene, a change of residence, childbirth and the completion of breastfeeding.

All of the above measures lead to the spontaneous disappearance of white carious spots without drug therapy. Calcium, phosphorus and fluorine enter the foci of demineralization from the oral fluid, which has a pronounced remineralizing activity and is able to normalize the permeability of enamel, which has been increased as a result of exposure to organic acids. In turn, it should be noted that the course of caries in a cariesogenic situation is characterized by rapidity, the presence of pigmented decay of dentin, chipping and sharp edges of enamel. Such a caries clinic in a cariesogenic situation is characterized by acute flowering or decompensated caries, that is, high activity of the course.

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