



## DENTAL CARIES IS A DISEASE OF CIVILIZATION

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### ABSTRACT

*Various factors of etiology, pathogenesis of dental caries, including nutrition, social mores and habits of a person and their role in the occurrence of dental caries are considered. It is shown that this disease is a typical disease of civilization. Its widespread distribution and the increasing infestation of the population are directly related to the introduction of sugar into the human diet as a mass, inexpensive and delicious food product. This happened in the late XIX – early XX centuries, which coincides with a sharp wave of increased incidence of caries. A further increase in the proportion of sugar in the diet quickly led to a continuous incidence of caries among the population. In many ways, this was facilitated by the peculiarities of sugar as a food product, as well as the mores and habits of people. The interrelationships of etiological and pathogenetic aspects of dental caries with human nutrition, the peculiarities of carbohydrate consumption and other factors are shown, and the main recommendations for the prevention of dental caries are given.*

The most important result of the study of dental caries over the past 100 years has been the recognition of the fact that the emergence, development and widespread spread of caries is directly related to the civilization of society, especially with the most important factor of civilization - the modification of diet and nutrition in general.

It is reliably known that the ancient peoples practically did not know caries. In the excavations of the IX–XII centuries, caries was found in 0-10% of skulls, and its intensity was represented by single lesions. Especially interesting is the fact that the nobility already in ancient times (Egi- pet, Rome) was affected by caries ten times more often than the ordinary population.

The first significant increase in the incidence of dental caries coincided with the appearance of methods of fine grinding flour and mass food products from it. This happened in the XVIII–XIX centuries and led to the emergence of the first wave of the spread of dental caries. During this period, both the prevalence and intensity of dental caries gradually increased, from single lesions to 20-40% of the population, and gradually the incidence of caries became universal [9]. The second, main wave of the increase in the prevalence of dental caries among the world's

population is associated with the development of methods of mass production of cheap and available beet and cane sugar (sucrose). It happened at the turn of the XIX–XX centuries. As a result, sugar has become a mass and publicly available food product. At the same time, a significant increase in the prevalence and intensity of dental caries continued, continuing to the present time. From the end of the last century to today, the prevalence of dental caries has increased from 20-40% of the population to 80-100% (Table 1). At the same time, the average intensity of dental caries damage today is 3.0-7.0 teeth per person aged 12 years versus 1.0-2.0 at the end of the XIX century. The era of the galloping invasion of caries in most countries of the world, where mass prevention is not carried out, continues, and it manifests itself in two indicators – in an increase in the intensity of the lesion in each person and in an increasingly early loss of teeth. There are cases of complete toothlessness in persons 30-35 years old. Especially illustrative are examples of the role of civilization in modifying the nutrition of the peoples of the North, who in the middle of the XX century practically had no caries (Khanty, Mansi, Nenets, etc.). The revolutionary change in the nature of nutrition that occurred among them in the 50-70s of the last century led to an increase in the prevalence of caries among them to 50-70%. During this time, the indigenous population of the North of Russia from the traditional consumption of raw fish, meat, and a large amount of fat switched to the usual diet of Northerners with imported products - meat, cereals, bread, canned food, sugar and sugar-containing products with appropriate culinary processing of food and conditions of its consumption. As a result, since the 70s. to date, both the prevalence and the intensity of the incidence of caries among them have practically equaled the incidence of the alien population [11]. All this happened in some 40 years!

Two factors played an important role in the victorious march of dental caries on Earth: the characteristics of sugar as a food product, as well as the mores and habits of a person. Sugar (sucrose) is practically the only food whose metabolism begins and can end in the oral cavity. It has everything for this: sufficient humidity, optimal and constant temperature, the presence of a complete set of enzyme systems of microbial origin necessary for the glycolysis process. As a result, any intake of sugar causes an instantaneous "metabolic" explosion in the mouth, the result of which is the active production and accumulation of acid in the places of retention of food (Fig. 1), in the oral cavity (tongue, plaque, pits and fissures of teeth, contact and adjacent surfaces of teeth).

The second factor, which is determined by the mores and habits of a person, is the use of sweet food uncontrollably, as the last food item at a meal (dessert), between meals, at night. This significantly aggravates the situation, since such habits prevent normal self-cleaning oral cavity, aggravate acid production and its harmful effect on teeth. The consumption of sweet food during the described periods inevitably leads to its retention in the mouth, an increase in the time of its stay, activation of sweet metabolism and active acid production, a certain contribution to the described processes was made by a change in human chewing activity and the appearance of new types of food products and ways of consuming them, invariably accompanying civilization. This is due both to the improvement of the culinary processing of food, and to its new properties – an increase in the stickiness and softness of food products, an increase in their residence time in the mouth, a decrease in the need for chewing efforts. This inevitably leads to the development of chewing laziness and deterioration of self-cleaning of the oral cavity. The conducted studies have shown that

the majority of the population nowadays is characterized by chewing laziness. People prefer bread pulp, ground meat, peeled fruits. Only 20-30% of the population likes coarse, hard, hard food. Undoubtedly, this factor of civilization has also contributed to the incidence of caries.

There are also serious objective data on the role of carbohydrates in the nutrition of the population. From the end of the XIX century to the present time, the amount of sugar consumed per capita has increased from 0.5-2.0 kg per year to 40-60 kg at present. Accordingly, there is a direct proven relationship between sugar consumption and the incidence of dental caries

Thus, the emergence and development of dental caries in mankind is closely related to civilization, with a change in the nature of human nutrition and habits, and therefore dental caries can be rightfully attributed to diseases of civilization.

The etiology and pathogenesis of dental caries are well studied and known. It has been proved with absolute accuracy that dental caries is a chronic infectious disease, and its cause is the nonspecific microflora of the human oral cavity, mainly *Streptococcus mutans*. It has been proven for sure that there is no caries without microbes. Since the 1950s, the experiments of researchers who extracted baby rats from the cavity of the rat's uterus in sterile conditions and then kept them in a sterile atmosphere on the harshest cariesogenic diets are well known. Some diets even led to the death of the result under the action of plaque acids, the enamel not only does not recover, but also, with repeated exposure to sugar and acids, it quickly collapses further. If this process occurs frequently, then an uncompensated shift on the surface of the enamel of the teeth towards demineralization gradually occurs and caries develops. The patho-genetic role in the occurrence of dental caries has also been accurately proven by experiments on its daily removal. If this procedure is performed qualitatively and regularly, then caries does not develop.

Resistance of dental tissues also plays an important role in the pathogenesis of dental caries. The level of resistance depends on the state of human health, on the laying and development of teeth in ontogenesis, on hereditary factors, on the content of fluoride in water and food. Therefore, different people have different levels of resistance to the action of cariesogenic factors. However, as the observations of the clinic and epidemiological surveys show, in the absolute majority of the population this level is insufficient to resist cariesogenic factors. The influence of the level of resistance is manifested in the intensity of carious damage, as well as in the greater or lesser age dynamics of the occurrence of caries animals, but in no case has caries ever developed. If non-specific microflora was added to the diet of these animals, this inevitably led to the development of dental caries.

In humans, the main caries-causing role is played by the unpretentious microflora of the oral cavity such as *Streptococcus mutans*, which is capable of long-term existence in the conditions of the human oral cavity and has adapted well to periodic food intake.

The pathogenesis of dental caries is largely related to the mores and habits of a person and the properties of the microflora of the oral cavity. The pathogenesis of dental caries is based on a systematic violation of the equality of the processes of de-

and remineralization in the oral cavity [5]. Demineralization occurs as a result of periodic acts of acid production associated with meals containing sugar. As a result of the retention of sucrose residues in the oral cavity (mainly on the tongue) under the influence of microflora, their utilization occurs, accompanied by the production of organic acids. This process takes place in plaque – a thin whitish-translucent film on the surface of the teeth, mainly on their poorly cleaned surfaces - neck areas, fissures, and contact surfaces. This plaque is essentially a microbial colony and is an autonomous formation consisting of non-specific microflora of the oral cavity [4]. It contains a depot of polysaccharides (levan, dextran) coated with a film specially produced by microbes that protects the colony from the action of oral cavity factors. When sugar enters the mouth, its metabolism immediately begins by glycolysis to the formation of organic acids, mainly lactic, as well as storing food for the future in the form of a depot of polysaccharides. These phenomena are accompanied by a decrease in the pH in the raid to 4.0–6.0. At this pH, tooth enamel dissolves (Fig. 3). Acid production in plaque also affects saliva. Due to the intake of acids from the plaque, the pH of saliva is acidified to 5.8–6.2. Such acidification of saliva violates the degree of its saturation with salts of Ca and P. It goes from a state usually oversaturated with mineral components to a non-saturated state, which contributes to the dissolution of enamel. In the re- pathogenesis of caries, the content of fluoride in water and food also plays a significant role. Its effect has three pathogenetic aspects. Firstly, fluorine forms hydroxyphlorapatite with hydroxyapatite enamel - a new compound that is much less susceptible to dissolution in acids than hydroxyapatite. Therefore, the optimal content of fluoride in water (1 mg / l) and in food, its deposition during the laying and development of teeth in the enamel contributes to the resistance of teeth to caries. Secondly, fluorine inhibits one of the enzymes of glycolysis, which also prevents acid production. Thirdly, fluorine contributes to the retention of Ca and P in mineralized tissues and their better mineralization.

Clinical manifestations of caries before complications occur are expressed in the appearance of carious cavities, especially on poorly cleaned and salivary surfaces of teeth. In the early stages, acid demineralization occurs in the form of a fifth, which can be remineralized with the help of special remineralizing mixtures of therapeutic and preventive orientation, containing Ca, P and fluorine. However, when cavities occur, there is only one method of treatment – filling. Its essence consists in cleaning and removing the destroyed part of the tooth with the help of special tools, creating conditions for the replacement and fixation in the tooth cavity of the material replacing the tooth tissue - fillings. There are many different materials, tools for dental treatment, techniques for reliable fixation of the seal, but so far the success of such treatment largely depends on the art and manual skills of the dentist.

Domestic scientists have played an important role in the study of caries problems. Back in the 20s, Prof. D.A. En-tin [12] showed the important role of impaired interaction of saliva with the surface of teeth in the pathogenesis of caries. Professor I.G. Lukomsky [9] was one of the first scientists in the world to show the role of fluoride in the pathogenesis and prevention of caries. In 50-90 years . XX century. Russian scientists for the first time proved the role and importance of the mechanism

of permeability and solubility of dental tissues

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