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EFFECT OF FLUORIDE ON TOOTH ENAMEL

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Abstract
Maintaining the integrity of tooth enamel is one of the main tasks of dentistry. This article discusses the effects of fluorides on tooth enamel.

Keywords: enamel, zinc, oral health, hydroxyapatite, fluoride, caries.

Introduction

Zinc, along with other metal cations, has long been associated with decreased enamel solubility [1], and may also alter the growth of calcium phosphate crystals involved in remineralization. Thus, it has the potential to influence the dynamic balance of de/remineralization in the mouth.
Given the potential of zinc to influence both de- and remineralization, this apparent lack of consistent effect of zinc on caries may seem contradictory [2].
Enamel is a defective form of HA is often used as an enamel analogue during mechanistic studies of de- and remineralization. Simply put, zinc can interact with HA by adsorption on the surface of crystals and/or inclusion in the crystal lattice [3].

MATERIALS AND METHODS

The priority preventive direction of mineralization of tooth enamel in dentistry helps to reduce the increase in dental caries. It has been shown that macroelements such as calcium, phosphorus, fluorine, and zinc play an important role in the prevention of dental caries. Their preventive and therapeutic effects are determined by the inclusion of enamel apatites in the crystal lattice, as well as a decrease in the acidity of bacterial origin and the formation of buffer systems [4].
At the present stage, modern and progressive research methods are being developed to prevent childhood caries, such as:
- digital radiography;
- low-intensity laser radiation;
- photodynamic therapy;
- fluorescence;
- electrical conductivity;
- low-frequency ultrasound;
- electrophoresis, as well as biochemical rapid tests and others [5].

It is an undeniable fact that the cariogenic situation in the oral cavity develops more actively and clinically manifests itself faster with poor oral hygiene, due to abundant dental plaque and tartar. Improper oral care contributes to the appearance of soft plaque, which prevents the entry of

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necessary macro- and microelements into the tooth enamel, thereby disrupting the process of enamel maturation [2]. Timely and effective removal of dental plaque reduces the risk of the cariogenic properties of bacteria and organic acids occurring.

RESULTS AND DISCUSSION

Many etiological factors take part in the pathogenesis of the carious process. The theoretical basis for preventive measures for caries is the timely provision of conditions for the qualitative and quantitative process of mineralization of tooth enamel in childhood. Therefore, the leading problem in the prevention of caries in children is measures aimed at stimulating the processes of mineralization and maturation of tooth enamel, through the administration of the main components of enamel - calcium, phosphorus, fluorides, as well as substances that ensure their metabolism. The leading one is the deficiency of fluoride ions in the body. Therefore, fluoride-containing substances are recognized as the most effective and affordable option for the prevention of dental caries. Exo- and endogenous methods of fluoride prevention of caries are most widespread in the world [3]. This is the only method that has achieved a real reduction in the incidence of caries. According to domestic and foreign authors, the effectiveness of these methods ranges from 25 to 50%. It should be noted that fluoride plays a significant role in the processes of mineralization and development of teeth, the formation of dentin and tooth enamel, as well as bone formation. Optimal intake of fluoride into the body ensures an increase in the resistance of the outer layer of tooth enamel during caries and the action of pathological factors [4].

The influence of fluoride on the occurrence of pathological changes in teeth was discovered unexpectedly when a connection was established between the increased fluoride content in water and the presence of fluorosis of teeth and bones. By introducing fluoride preparations into drinking water and, conversely, defluoridating water to prevent fluorosis, the possibility of preventing caries disease has been proven [3].

It is known that methods of primary prevention are combined into four groups

- endogenous and exogenous, medicinal and non-medicinal. An important place in drug prevention of caries is given to fluoride preparations. World experience and research have shown that the comprehensive fluoride prophylaxis system has the following positive features:

- the introduction of additional fluoride ions into the oral fluid helps restore tooth enamel;

-reduces the permeability of microorganisms in tooth tissue; - slows down the action of soft plaque microorganisms;

- prevents the processes of mineralization of tooth enamel; has an antibacterial effect; - has a stimulating effect on all connective tissue derivatives;

- stimulates immune reactions, and finally reduces the incidence of caries by up to 65%. [4].

Effective fluoride prevention of dental caries is carried out mainly in two ways - the use of fluorides locally and internally, i.e. There are two main ways: a) systemic - the intake of fluorides into the body with water, salt, milk, in tablets or drops; b) local: use of solutions, gels, toothpastes, varnishes. Based on the body's needs, with proper use of fluoride-containing medications, you can easily compensate for the lack of fluoride. To systematize the inclusion of fluoride in the body and in the hard tissues of teeth, the WHO Expert Committee proposes to differentiate methods of fluoride prevention of dental caries as endogenous and exogenous [4].

The introduction of a caries prevention program through the endogenous use of fluoride, in particular through water fluoridation, is the most accessible and cost-effective compared to other

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methods of primary prevention of CD [3]. Fluoridation of drinking water is carried out in areas where the fluoride content in sources does not exceed 0.7 mg per liter. By installing fluoridation plants at water intake stations, the fluorine concentration is brought to optimal values of 0.9-1.2 mg/l. Its effectiveness is most pronounced in childhood and reaches a 25-40% reduction in the increase in caries [5].

However, fluoridation of drinking water, often considered as an effective measure worthy of widespread implementation, can, together with fluoridation of food products, increase the concentration of fluoride ions in saliva to a maximum. This concentration of fluoride can, at best, compensate for the deficiency of OH ions in a very thin layer of plaque on the smooth surface of the tooth. No undesirable effects were detected; the safety of fluoridated water can be considered established [3]. It should be noted that the range of physiological concentrations of fluorine in water is very narrow, and makes the problem of hygienic regulation of fluoride in water very acute. It should also be taken into account that high amounts of fluoride (more than 1.5 mg/l) can lead to fluorosis.

CONCLUSION

A fairly cheap and relatively effective method of endogenous use of fluoride in the mass prevention of dental caries is fluoridation of table salt. This method is mainly widely used in different areas of the city with different levels of fluoride in drinking water. Fluoridated salt helps increase oral fluoride concentrations throughout life. In the course of the studies, it was concluded that the intake of fluoridated salt containing 250 mgF/kg is more appropriate for the prevention of dental caries than fluoridated drinking water [4].

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