



DENTAL DISEASE CAUSED BY ENERGY DRINKS.

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Abstract. In this article, dental diseases caused by energy drinks occupy a special place due to their prevalence, complexity of diagnosis and treatment. In scientific sources, studies conducted over the past twenty years indicate that up to 32% of oral diseases are observed as a result of energy drinks, and up to 47.5% of these diseases are accompanied by various syndromes.

Keywords. Caffeine, psychostimulant, taurine, etiopathogenetic views, platelet aggregation, tachycardia.

In recent decades, energy drink consumption has increased worldwide. Many studies have shown a direct relationship between dental erosion and the consumption of these drinks, due to their low pH and variable titratable acidity. Dental erosion and caries are typical diseases that cause damage to hard dental tissues. Recently, an increase in dental erosion has been noted under the influence of large amounts of acidic drinks. Caries is the destruction of hard dental tissues under the influence of inorganic acid produced by oral bacteria.

What do energy drinks contain? A huge amount of sugar! Citric acid has a detrimental effect on teeth, destroying enamel. acid (E338) washes calcium out of the body and, as a result, destroys teeth, makes bones brittle. Artificial dyes stain tooth enamel. It is a fact that energy drinks cause erosion of tooth enamel! When they get into the oral cavity, the teeth literally "bathe" in acid. Frequent use leads to the formation of cracks in the teeth, changes in the color of the enamel, hypersensitivity, erosion and demineralization. And when things go too far, the entire tooth is damaged, and its loss is possible.

Dental erosion is the irreversible destruction of hard dental tissues as a result of the chemical action of acid without the participation of bacteria. Tooth enamel was examined using scanning electron microscopy. Significant surface changes were observed, such as widening of enamel pores and heterogeneous structure of enamel prisms. It is noteworthy that after contact of the tooth with acidic sports and energy drinks, the concentration of calcium and phosphorus ions in the enamel and dentin decreased as a result of their erosive action. During this period, attempts were made to reduce the erosive potential of drinks.

The most effective ways to reduce the erosive and cariogenic potential were modification of the beverage composition by reducing the content of acidic components and the total sugar concentration, increasing the pH of the beverage, adding calcium, phosphate and fluoride ions. The introduction of new non-toxic remineralization strategies that do not contain fluoride will restore the health of dental tissues without the risk of exposing patients to the potential side effects of fluoride and will facilitate preventive measures for patients with a high predisposition to caries and erosion [1].

Energy drinks are used to increase physical endurance and alertness, improve reaction time, improve concentration, and stimulate metabolism during sports, driving, and other outdoor activities. The most commonly consumed energy drinks contain large amounts of "carbohydrates" such as glucose, fructose, sucrose, and synthetic maltodextrins. On the other hand, energy drinks contain "caffeine, plant extracts of guarana, ginseng, and ginkgo biloba, B vitamins, amino acids such as taurine, amino acid derivatives such as carnitine, and sugar derivatives." According to a new study by the Oral Health Foundation, nearly one in four Kyrgyz adults say they drink energy drinks to get through the day [2].

More than one in ten people say they drink an energy drink at least once a day, and among people aged 25 to 34, this figure rises to almost one in three. Some energy drinks contain 55g of sugar, which is equivalent to 14 teaspoons of sugar and almost twice the recommended daily intake of free sugars. According to researchers, tooth enamel erosion begins as early as 5 days after consuming energy drinks. It turns out that the acid content in energy drinks is so high that it can gradually damage tooth enamel. When tooth enamel is damaged, the mouth becomes more susceptible to bacteria due to the lack of protection provided by the enamel. If bacteria gets into the teeth, this can lead to serious dental problems. Without enamel protection, teeth can become sensitive. This can cause pain and discomfort when certain foods are consumed. Inflammation of the roots of the teeth and bleeding gums can occur. Since caffeine destroys tooth enamel, teeth can be subject to caries and decay. The consequences of caries can be very serious, since enamel does not recover after damage.

The type of acid and the ingredients included in the composition also affect the erosive potential of energy drinks. Citric acid, also known as acidifier 330 according to the International Food Additive Numbering System [3], is widely used in soft drinks. Due to its chelating ability, which is responsible for the removal of calcium from saliva and teeth, this acid is one of the most powerful. The citrate anion has the ability to chelate calcium. The chelating effect is supplemented by the erosive potential of the released proton ions. According to numerous studies, drinks containing citric acid with a low pH level have the greatest erosive capacity.

It has been found that drinks containing citric acid have a higher erosive potential than drinks containing maleic acid. Surface degradation can also be adversely affected by the acidic nature of energy drinks. Subsurface ions such as Ca, Al and silicon will be lost. Surface degradation may begin. This may result in decreased wear resistance and surface roughness. Surface roughness due to wear and chemical degradation may also affect the "gloss" and consequently increase external staining. One study reported that resin materials are susceptible to surface roughness degradation after immersion in sports drinks. The pH of energy drinks may cause erosion of composite resins under acidic conditions. Acids contained in these drinks may penetrate the resin matrix and release unreacted monomers into the environment. This may result in decreased surface hardness values of composite resins [4]. In addition, the surface hardness of the restorative material depends on the duration of exposure and the composition of the material. However, previous studies have shown that these drinks have the potential to cause dental erosion, which can affect the mechanical and physical properties of the material. In addition, the type of acid included in the solutions could reduce the surface hardness of the restorative materials.

It has been reported that organic fillers can be damaged by citric acid, which is contained in many sports and energy drinks. In short, frequent consumption of sports and energy drinks can lead to damage to internal composites and reduce durability. In addition, saliva supplies calcium and phosphate ions for remineralization and proteins for the formation of protective pellicle. The buffering capacity of saliva is also considered an important factor, even more important than pH. A significant protective effect against enamel erosion can be achieved by modifying citric acid in acidic drinks by including calcium, phosphate and fluoride in them, and by diluting the drinks by adding water or reducing the total sugar concentration [5].

The caffeine in energy drinks acts as a diuretic, causing you to urinate, which can lead to dehydration. Dehydration can negatively affect saliva production, leading to dry mouth. Saliva is essential for oral health because it washes away food particles, neutralizes acids, and helps remineralize tooth enamel. The risk of dental problems such as cavities and bad breath increases when saliva production decreases.

Energy drinks often contain artificial colors and additives that can cause tooth discoloration in the long term. Unsightly tooth discoloration can result from a combination of the acidic properties and chromogens contained in the drinks. With long-term consumption of energy drinks, teeth can become noticeably stained and the aesthetics of the smile can be compromised. Energy drink components can be particularly damaging to the teeth of children and adolescents because mineralization in immature permanent enamel is not complete, allowing for increased susceptibility to the aggressive nature (of these drinks). However, previous studies have shown inconclusive results when comparing the dissolution rates of primary and permanent enamel. In the present study, the percentage of mass loss in primary enamel samples was lower (although not statistically proven) compared to permanent enamel samples [6].

Primary enamel of teeth has a higher degree of porosity and a lower degree of mineralization than permanent enamel, which suggests that primary enamel is more susceptible to the effects of soft drinks. A study by dentists that examined the sensitivity of primary and permanent enamel to the effects of citric acid showed that primary enamel is more susceptible to dissolution than its permanent counterpart.

In this study, the primary enamel samples included small areas of dentin tissue, which may have affected the percentage of mass loss. The possible reason for the decreased mass loss of primary enamel could be the buffering properties of the organic components of dentin, and the collagen content served as a barrier to diffusion in the low pH environment of soft drinks. Dentists have a responsibility to counsel their patients on the consumption of foods and beverages that may be detrimental to dental health. Most foods and beverages do not have a significant effect on dental health.

Drinks that can be harmful to teeth and restorative materials include sports and energy drinks, which contain sugar that feeds oral bacteria, and drinks with low pH levels, which can erode teeth and increase sensitivity. Patients who suffer from poor oral health due to excessive consumption of sports and energy drinks should be educated about the likely causes of their dental problems.

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