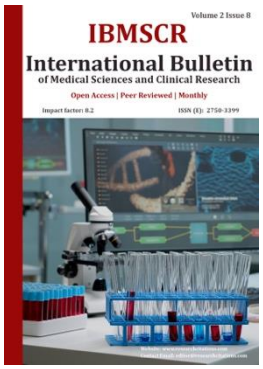

THE EFFECT OF ENERGY DRINKS ON THE CONDITION OF DENTAL HARD TISSUES.

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Abstract. This article presents the composition, nature of energy drinks, the mechanism of their action on the human body. Studies show that when energy drinks are consumed more than normal and chronically, they negatively affect certain organs and systems in the human body (cranial, central nervous system, joints), and in people who consume it more often, a state of tobelik is observed. Excessive consumption of this drink leads to such consequences as liver, cardiovascular disease, diabetes mellitus, cancer, which deliver serious damage to cells and tissues in the human body.

Key words. Caffeine, taurine substances, cranial, central nervous system, joints.

What does energy contain? A lot of sugar! Citric acid has a detrimental effect on teeth, destroying the enamel. acid (E338) — leaches calcium from the body and, as a result, destroys teeth and makes bones brittle. Artificial dyes — stain the enamel of teeth. It is a fact that energy drinks cause tooth enamel erosion! When they enter the mouth, the teeth are literally "bathed" in acid. Frequent use leads to the formation of cracks in the teeth, discoloration of the enamel, hypersensitivity, erosion and demineralization. And when it goes too far, the entire tooth is damaged, and its loss is possible.

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

Dental erosion is the irreversible destruction of the hard tissues of the tooth as a result of the chemical action of acid without the involvement of bacteria. The enamel of the teeth was examined by scanning electron microscopy. Significant surface changes were observed, such as the expansion of enamel pores and the heterogeneous structure of enamel prisms. It is noteworthy that after the tooth came into contact 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 effect.

During this period, attempts were made to reduce the erosive potential of beverages. The most effective ways to reduce the erosive and cariogenic potential were to modify the composition of the drink by reducing the content of acidic components and the total sugar concentration, increasing the pH of the drink, and adding calcium, phosphate, and fluorine ions. The introduction of new non-toxic remineralization strategies that do not contain fluorides will restore dental tissue health without exposing patients to 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, increase reaction time, improve concentration, and stimulate metabolism during sports, driving, and 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, guarana plant extracts, 51 - Medical Sciences - International Journal of Humanities and Natural Sciences, vol. 10-1 (85), 2023 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 conducted by the Oral Health Foundation, almost one in four Kyrgyz adults says they consume energy drinks to stay fit throughout the day[2].

More than one in ten says they consume 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 55 grams of sugar, which corresponds to 14 teaspoons of sugar and is almost twice the recommended daily allowance of free sugars. According to researchers, tooth enamel erosion begins as early as 5 days after drinking energy drinks.

It turned out that the acid content in energy drinks is so high that it can gradually damage tooth enamel. If the tooth enamel is damaged, the mouth becomes more susceptible to bacteria due to the lack of protection provided by the enamel. If bacteria get into your teeth, it can lead to serious dental problems. Without the protection of the enamel, teeth can become sensitive. When eating certain foods, it can cause pain and discomfort. Inflammation of the roots of the teeth and bleeding gums may occur. Since caffeine destroys tooth enamel, teeth can be subject to caries and decay. The consequences of caries can be very serious, as the enamel does not recover after damage.

The type of acid and the ingredients included in the composition also affect the erosion potential of energy drinks. Citric acid, also known as acidifier 330 according to the International Numbering System of Food Additives, is widely used in soft drinks [3]. Due to its chelating ability, which is responsible for removing calcium from saliva and teeth, this acid is one of the most powerful. The citrate anion has the ability to chelate calcium. The erosive potential of the released proton ions is added to the chelating effect.

According to numerous studies, drinks containing citric acid with a low pH level have the greatest erosive ability. It has been found that drinks containing citric acid have a higher erosive potential than drinks containing maleic acid. The acidic nature of energy drinks can also negatively affect the degradation of the surface. Subsurface ions such as Ca, Al, and silicon will be lost. Surface degradation may begin. This can lead to a decrease in wear resistance and surface roughness. Surface roughness as a result of wear and chemical degradation can also affect the "gloss" and, as a result, increase the external staining.

One study reported that resin materials are susceptible to surface roughness degradation after immersion in sports drinks. The pH of energy drinks can cause erosion of composite resins under acidic conditions. The acids contained in these drinks can penetrate the resin matrix and release unreacted monomers into the environment. This can lead to a decrease in the surface hardness of composite resins[4].

In addition, the surface hardness of the restoration material depends on the duration of exposure and the composition of the material. However, previous studies have shown that

these drinks can potentially cause tooth 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 restoration materials. It has been reported that organic fillers can be damaged by citric acid, which is found in many sports and energy drinks - Medical Sciences - International Journal of Humanities and Natural Sciences, vol. 10-1 (85), 2023 synthetic drinks.

In short, frequent consumption of sports and energy drinks can damage internal composites and reduce durability. In addition, saliva supplies calcium and phosphate ions for remineralization and proteins for the formation of a 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 fluorine in them, as well as by diluting drinks with water or reducing the total sugar concentration[5].

The caffeine found in energy drinks acts as a diuretic, causing the urge to urinate, which can lead to dehydration. Dehydration can negatively affect saliva production, leading to dry mouth. Saliva is essential for maintaining oral health, as it flushes out food particles, neutralizes acids, and promotes the remineralization of tooth enamel. The risk of dental problems such as tooth decay and bad breath increases with a decrease in saliva. Energy drinks often contain artificial colors and additives that can cause teeth discoloration in the long run. An unsightly discoloration of teeth may be the result of a combination of acidic properties and chromogens contained in beverages.

With prolonged use of energy drinks, teeth may noticeably stain, and the aesthetics of a smile may be impaired. The components of energy drinks can be particularly damaging to the teeth of children and adolescents, since mineralization in the immature permanent enamel is not complete, which makes it possible to increase susceptibility to aggressive nature (of these drinks). However, previous studies have shown inconclusive results comparing the dissolution levels of primary and permanent enamel. In the present study, the percentage of weight loss of primary enamel samples was lower (although this has not been statistically proven) compared with permanent enamel samples[6].

Primary tooth enamel 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 dental study 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, primary enamel samples included small areas of dentin tissue, which could affect the percentage of weight loss. A possible reason for the decrease in primary enamel mass loss could be the buffering properties of the organic components of dentin, and the collagen content served as a barrier to diffusion into a low-pH environment of soft drinks.

Dentists are required to advise their patients on the use of food and beverages that may harm dental health. Most foods and beverages have no noticeable effect on dental health. Drinks that can harm teeth and restoration materials include sports and energy drinks containing sugar that feeds oral bacteria, and drinks with low pH levels that can destroy teeth and increase sensitivity. Patients suffering from poor oral health due to excessive consumption of sports and energy drinks should be aware of the likely causes of their dental problems.

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