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Effects of The Acidity of Beverages on The Hard Tissues of Teeth

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Abstract
In the Republic of Uzbekistan, an online survey was conducted among different age groups to determine which drinks are consumed most often (240 respondents). The pH value of 26 drinks was measured using a litmus test and a pH meter. The beverage was determined based on these ph values and distributed to a group of liquids according to their erosion potential. Five drinks were used for the enamel resistance test (ERT): pineapple juice, lemon juice, red wine, white wine, and green tea. The most aggressive fluid for the hard tissues of the teeth was determined. As a result of the experiment, the drink that has the most aggressive impact on the hard tissue of the tooth is lemon juice and within 3 days reduces the resistance of the enamel against caries by 3.33 times.

Keywords: Beverage, hard tooth tissue, acidity of caries resistance

Introduction

The corrosion of hard tooth tissue is a gradual loss of enamel and dentin as a result of acid decomposition. The prevalence of tooth erosion is high and is steadily increasing among the population [3]. A recent study conducted in Israel [4] showed that the prevalence of erosion was 15% in the 18〜to〜36.6-year-old group and 55% in the 60-to-61.9-year-old group. 1. One of the main factors contributing to the occurrence of erosion is the frequent consumption of low pH beverages, the consumption of low pH soft drinks continues to increase, and knowledge of their erosive potential is important for diet therapy and dental counseling. The drinks consumed contain a variety of acids, such as carbonic acid, organic acids from fruits, tartaric acid, citric acid, malic acid, tartaric acid [1-3]. In recent years, diets with low pH foods and beverages (such as a diet of lemon or vinegar) have become more and more popular, but not everyone is aware of its harmful effects, and to quench thirst, more and more people use sweet or non-carbonated drinks instead of ordinary water, which also adversely affects the condition of the hard tissues of the teeth (but not only that). (There is no such thing as "no".)

Purpose of the Study

To study the effect of drinks with low pH levels on the hard tissues of the teeth. Questionnaires on beverage preferences were provided to different age groups, and the pH of the beverages studied was measured using TER before and after the corrosive of the beverage and the exposure to the beverage to determine the durability of the enamel.

Materials and Methods

Questionnaires on the most frequently consumed drinks were conducted among residents of the Republic of Uzbekistan (240 respondents) of different age groups. According to the results of the survey, 26 drinks were selected and their pH was measured during the experiment using a litmus test and a pH meter. The device has a unit measuring range of 0-14pH, a splitter of 0.1 and an absolute error of ±0.1pH units. We calibrated the PH meter and measured the pH of the drink by lowering the ph meter electrode to a clean beaker for 30 seconds. When the PH meter readings no longer changed, the pH value of each drink was recorded. In addition, TER was performed for several beverages (1M HCl solution, 10 point scale, dye). Results and discussion According to the results of the survey, the most frequently consumed liquid was water (36%), followed by tea (34%) and coffee (23%). The most popular juice was orange juice (28%), and the liquids with the lowest pH were balsamic vinegar (1.5), lemon juice (2.0), Coca-cola (2.5) and white wine (3.5). These liquids turned out to be the most aggressive. The pH of coffee, tea and coffee with milk is above 5.5. Despite the fact that the erosive properties of beverages depend on the complex interaction of many factors, including the type of acid, acid concentration, temperature, time spent in the mouth of the beverage and the buffering capacity of saliva, pH is now considered to be an indicator of the erosive properties of food and beverages. pH values were used to identify groups of drinks and liquids depending on their erosive properties. 5 beverages (pineapple juice, lemon juice, red wine, white wine, green tea) were tested for enamel resistance (TER). TER was carried out at the beginning of the experiment, and after 3 and 7 days of exposure to these solutions,Measured according to Okushko's method. Hydrochloric acid with a diameter of 1.5-2 mm was dripped onto the plaque-free, air-dried vestibular surface of the teeth using a pipette, and after 5 seconds the drops were removed with a dry cotton swab, and a 1% solution of methylene blue was dripped onto the damaged enamel and adjacent intact enamel. After removing the dye with a dry cotton swab, the staining area of the enamel was evaluated on a standard 10-point scale: 1-3 points (light staining) - high caries resistance; 4-5 points- medium; 6-7 points-low; 8 points or more- very low caries resistance of the enamel.The results of the experiment showed that lemon juice has the greatest effect on the hard tissues of the teeth in the drink, reducing the tooth decay resistance of the enamel by 3 times in 3.33 days. Wine reduced caries resistance by 2.33 times (Figure. 4). Tea, on the contrary, did not affect the structural changes in the hard tissues of the teeth. According to a study by the University of Australia [5], tasters and sommeliers have a higher risk of developing tooth decay. The study showed that only 10 minutes of tasting can cause an early stage of enamel erosion, underscoring the need for preventive measures.

Conclusion

Prolonged exposure of a liquid with low acidity (pH5.5) to hard tooth tissue is accompanied by the development of erosion

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