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FULL LENGTH REVIEW ARTICLE

SPORTS DRINKS AND ITS EFFECT ON TEETH

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Abstract

A sports drink is a beverage designed to help athletes rehydrate, as well as restore electrolytes, carbohydrates, and other nutrients, which can be depleted after training or competition. Electrolyte and carbohydrate replacement promotes proper rehydration and energy production, which is important in delaying the onset of fatigue during exercise and helps in better sport performance. Sports drinks commonly contain phosphoric acid, citric acid**,** certain additives and organic acids that can advance dental erosion. All acids have an erosive potential but the method of drinking will influence whether or not those acids affect the teeth. The purpose of this paper is to highlight the effects of sports drinks on tooth, which results in tooth erosion.

Keywords: Sports drinks, Acidic Sources, Types, Oral Health, Erosion

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INTRODUCTION

Sports drinks are non-alcoholic, flavoured, carbonated beverages, usually commercially prepared and sold in bottles or cans. In modern societies, the increased consumption of acid drinks as soft drinks, sport drinks, fruit juices is increasingly becoming more important because of the concern for dental erosion. Soft drink intake, even of relatively short duration, has been found to reduce enamel microhardness. Furthermore, the total acid level, acid type, concentration of phosphate, calcium and fluoride in food drinks have a modifying effect on the development of dental erosion. Temperature and exposure time had also been discussed as important to the erosivity of beverages (Erosive Potential of Soft Drinks in Nigeria, 2007). Dental erosion, is the irreversible loss of tooth structure due to chemical dissolution by acids not of bacterial origin (Erosion, 2009). Erosion is found initially in the enamel and, if unchecked, may proceed to the underlying dentin. Frequently consumed foods and drinks below pH 5.0–5.7 may initiate dental erosion (www.google.com, www.ct.gov/dph). All acids have an erosive potential but the method of drinking will influence whether or not those acids affect the teeth. The purpose of this review is to highlight the effects of sports drinks on tooth, which results in tooth erosion.

CAUSES (www.google.com, www.ct.gov/dph).

Extrinsic acidic sources

Acidic drinks and foods lower the pH level of the mouth so consuming them causes the teeth to demineralise. Furthermore, sugars contained in foods and drinks also turn to acid, which further erodes the teeth. Orange and apple juices are common culprits among fruit juices. Carbonated drinks such as Coca-Cola are also very acidic. Frequency rather than total intake of acidic juices is seen as the greater factor in dental erosion; infants using feeding bottles containing fruit juices (especially when used as a comforter) are therefore at greater risk of acid erosion. Saliva acts as a buffer, regulating the pH when acidic drinks are ingested. Drinks vary in their resistance to the buffering effect of saliva. Studies show that fruit juices are the most resistant to saliva's buffering effect, followed by, in order: fruit-based carbonated drinks and flavoured mineral waters, non-fruit-based carbonated drinks, sparkling mineral waters. Mineral water being the least resistant Because of this, sports drinks in particular, may prolong the drop in pH levels. A number of medications such as vitamin C, aspirin and some iron preparations are acidic and may contribute towards acid erosion (Fig.1).

Intrinsic acidic sources

Intrinsic dental erosion is known as perimolysis, whereby gastric acid from the stomach comes into contact with the teeth. People with diseases such as anorexia nervosa, bulimia, and gastroesophageal reflux disease (GERD) often suffer from this.

GERD is quite common and an average of 7% of adults experience reflux daily. The main cause of GERD is increased acid production by the stomach (Fig.2).

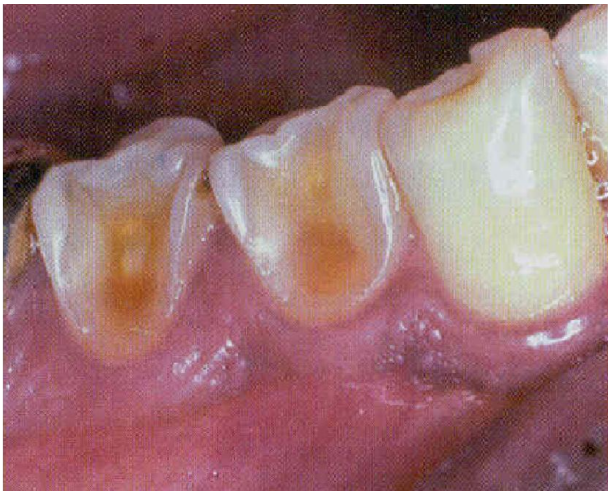

Fig.1. Erosion seen on the buccal aspect of the tooth

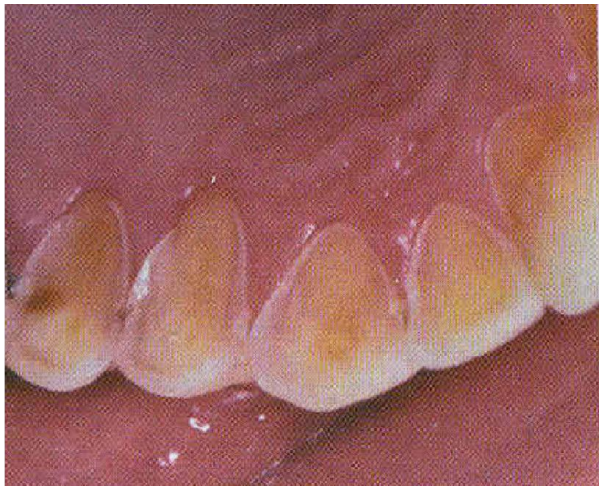

Fig. 2. Erosion seen on the palatal aspect of the tooth

Symptoms (www.google.com, www.ct.gov/dph).

EARLY

- Discoloration
- Tooth sensitivity
- Transparent appearance
- ADVANCED
- Cracking
- Dents
- Extreme sensitivity and pain

Pathogenesis

Depletion of body's carbohydrate stores

⇩

Dehydration

⇩

Sweating, loss of body fluid & electrolytes

Types of Sports Drinks (The Maintenance of Fluid Balance during Exercise, 1994)

- ***Isotonic*** - Fluid, electrolytes and 6 to 8% carbohydrate
- ***Hypotonic*** - Fluids, electrolytes and a low level of carbohydrate
- ***Hypertonic*** - High level of carbohydrate

Sports Drinks and Oral Health

(Sports drinks and teeth, 2005; The Maintenance of Fluid Balance during Exercise, 1994**)**

- Sports drinks are high in sugar- a single 20oz bottle contains over 80% of the recommended daily intake of sugar- that's two-thirds as much sugar as soda!
- Sports drinks often contain acidic ingredients like citric acid which also contribute to tooth decay.
- Frequent exposure to sports drinks may cause loss of tooth enamel (erosion) and/or decay. Sugars are converted to acid by bacteria in plaque. The acid dissolves the tooth enamel and can lead to tooth decay (Fig.3).
- More recent research has discovered that regular sports drink users may be putting their dental health at risk; in particular the protective tooth enamel has been found to erode 30 times faster with regular usage of sports drinks (which tend to be quite acidic) by comparison with plain water!
- But help may be at hand in the form of the next generation of sports drinks. A recent study has examined the effects of adding an inhibitor of tooth enamel corrosion known as CPP-ACP (Casein Phosphopeptide- Amorphous Calcium Phosphate) to sports drinks. However, adding CPP-ACP to the Powerade at progressively higher concentrations steadily reduced acidity. More importantly, CPP-ACP concentrations of 0.09% and above completely eliminated these enamel erosion lesions. Given that the compound CPP-ACP is otherwise inert, i.e it has no biological effects – it looks a promising candidate for inclusion in the next generation of 'tooth-friendly' sports drinks.

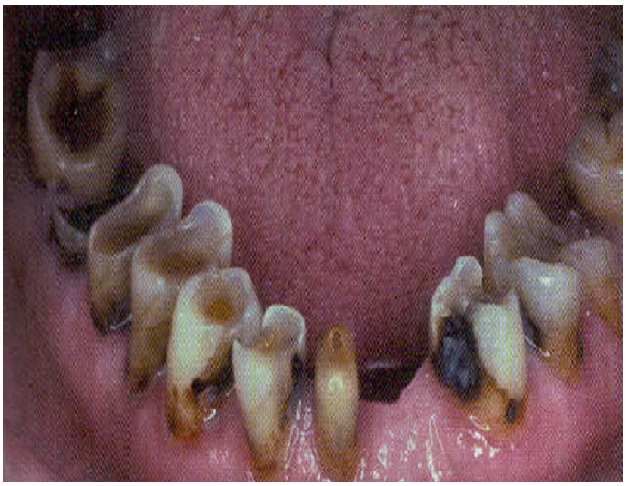

Fig. 3.Erosion seen on the occlusal aspect of the tooth

Some Key Tips to Prevent Erosion (Sports drinks and teeth, 2005)

- Try and avoid consuming acidic food and / or drink too often during the day. Try to have them only at meal-times.
- Drink acidic drinks quickly - don't sip them. And don't swish them round your mouth.

- Between meals you should only have 'safe' drinks, which are not sugary or acidic. Milk and water are 'safe' drinks. So are tea and coffee if you do not add sugar to them (you can use non-sugar sweeteners).
- You should try and avoid snacking between meals. If you do snack, only have 'safe' snacks, which are not sugary or acidic. Fruits, vegetables and products (such as sandwiches, toast, crumpets and pitta bread) are all 'safe' snacks. Some fruits, especially citrus fruits, are acidic and are known to cause erosion if they are consumed in large quantities. This is not normally a problem for most people; however, you could discuss with your dentist or hygienist the safest way of enjoying these fruits.
- Because acids temporarily soften the tooth surface, don't brush your teeth immediately after eating or drinking something acidic.
- You should brush your teeth twice a day, and always use a fluoridated toothpaste.
- During hard exercise, carbohydrate can be depleted at a rate of 3-4 grams per minute. If this is sustained for 2 hours or more, a very large fraction of the total body carbohydrate stores will be exhausted and if not checked will result in reduced performance. Recovery of the muscle and liver glycogen stores after exercise will normally require 24-48 hours for complete recovery.

Table 1. Age wise requirement of water/day

Age	Requirement of Water/Day
KIDS	57OZ
BOYS (9-13 YRS)	81OZ
GIRLS (9-13 YRS)	71OZ
BOYS (14-18YRS)	77OZ
GIRLS (14-18YRS)	111OZ

Conclusion

For Young Athletes Water Is The Best Way To Rehydrate (The Maintenance of Fluid Balance during Exercise, 1994)

- It is the key that they start athletic activity well hydrated.
- They should drink 8-15oz of water during EVERY break in the action or every 15-20 min.
- WATER- *The ultimate sports drink*! (Table 1)

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www.google.com, www.ct.gov/dph

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