Sweet Advice
When a patient asks you for a dietary advice, do you know what to recommend?

Introduction
This article determines the dietary aspects of dental health, and in particular the relationship between sugar and caries. The cariogenic potential of sugar and other fermentable carbohydrates is evident. The fact that caries is still one of the most common disease in our society demonstrates that common practices of regular oral hygiene and the use of fluoride do not completely protect teeth from dietary risk factors.

There is a consensus that frequent consumption of carbohydrate foods and drinks is the main dietary factor in the development of caries. When advising patients about the relationship between diet and oral health, most dentists stress the importance of avoiding sugar between meals.

However, it is unrealistic to expect that patients would cut down sweet treats altogether. People have an inborn desire for the sweet taste, one of the four fundamental taste sensations. Today’s consumers – especially children – are surrounded with snacks, sweets and beverages high in sugar. If between-meal snacking is unavoidable, it is important to point out that there are products which have little or no risk on oral health. Realistic dietary advice is, therefore, not to forbid snacking, but to recommend toothfriendly alternatives.

Sugar and caries
Dental caries occurs when acid-producing bacteria dominate plaque on the surface of the tooth. The bacteria convert fermentable carbohydrates, i.e. sugars and starches, into lactic acid, thus making plaque acidic. The neutral pH value of saliva is 7.0. Once the value drops below 5.7, the acidic plaque causes the dental enamel to lose calcium and other minerals, eventually leading to cavities. Many common food products containing fermentable carbohydrates can, after consumption, drop a plaque pH below 4.

The development of caries requires the presence of sugars. Sucrose is one of the most, but not the only, cariogenic substance in the diet. Glucose, fructose, lactose and starch are examples of other fermentable carbohydrates. The frequency of sugar consumption is a significant contributor to caries. Every time fermentable carbohydrates are nibbled or sipped, demineralisation commences. This continues for about 30 minutes, or even longer if teeth are covered with old plaque. Repeated acid attacks do not give teeth the time to recover. Small amounts of snacks with fermentable carbohydrates eaten frequently during the day will increase caries risk more than large amounts eaten at once.

The amount of sugar consumed is less important than how quickly it is cleared from the mouth. The longer carbohydrate-containing foods are around the teeth, the more time bacteria have to produce acid and the greater the chance of demineralisation. For example, liquids which are consumed with a...
straw do not expose teeth as much as beverage which are sipped from a cup. Sticky foods like raisins or potato chips stay in the mouth longer than foods such as caramels and jelly beans. The reason for this is that sugar confectionery contain soluble sugars that are washed away more quickly by saliva. To motivate patients to reduce the number of snacks, it is vital to stress the importance of the main meals. Once the main meals are made up properly, the desire of eating between meals is reduced. The goal is not to exclude sugar from the diet but rather to consume sugar in a more sensible way, meaning reasonable amounts and mainly at mealtimes. Also, many sugary snacks can be replaced by sugar-free alternatives.

**Substituting sugar**

Today, nearly twenty different sugar substitutes are authorized for food production. Consumers often regard sugar substitutes as one homogenous group of “artificial sweeteners”. In reality, sugar substitutes differ from each other by origin, chemical composition, sweetness, energy value and physiological properties. Also the glycemic index (GI), i.e. the ability to increase blood sugar level, varies greatly. Sugar substitutes can be divided into two main categories: polyols (bulk sweeteners) and intense sweeteners. Polyols are carbohydrates, but unlike sugar, they are digested more slowly. They usually replace sugar in products with a ratio of 1:1. The most common polyols used in the food production today are sorbitol, isomalt, maltitol, mannitol and xylitol. They all produce little impact on blood sugar or insulin levels, and provide about half the calories of sucrose. The oral bacteria cannot ferment polyols, which makes them an ideal ingredient for toothfriendly sweets, chewing gum, toothpastes and mouth washes. Lately some chewing gum manufacturers have made claims that xylitol, one member of the polyol group, has superior dental benefits compared to other sugar substitutes. While xylitol is inevitably toothfriendly, the claim that it may be “anti-cariogenic”, is however not yet fully substantiated. There is no evidence to support the claim that xylitol is better for Saliva contains natural buffers to prevent the lowering of pH in the mouth to the point where enamel may become demineralised. The quantity and quality of saliva determines the extent to which teeth remineralise. To help increase the amount of saliva, it is recommended to rinse mouth with water after a meal. Water keeps saliva flowing, which neutralises the acid created by plaque. Another good option to stimulate salivary flow between meals is to consume sugar-free chewing gum or sweets. Chewing and stimulation of flavour receptors on the tongue increase the production and release of saliva.

**Dairy products and dental health**

Milk, cheese, yoghurt and other dairy products have their role to play as part of balanced diet. Milk contains lactose, which is the least cariogenic sugar. Although milk supports bacterial growth, it has a high buffering capacity and requires substantially more time than sucrose to produce caries. Milk may be encouraged as a snack drink in preference to more acidic drinks such as orange juice, soft drink, or flavoured mineral waters. Cheese, especially matured Cheddar-type cheese, is considered as particularly toothfriendly. The high calcium and phosphorus content seems to be a factor in the cariostatic mechanisms of cheese as well as the casein and cheese proteins. In vivo studies have shown that cheese which is eaten immediately after sugar naturalizes the saliva pH fast and can help protect against demineralisation.

**Food acids and erosion**

Tooth erosion is the loss of dental hard tissue from the tooth surface
teeth than other sugar substitutes. Intense sweeteners include sucralose, ascesulfame K, aspartame, cyclamates, saccharin, thaumatin and neohesperidine DC. These ingredients provide sweetness with practically zero calories. Hence their extreme sweetness, only minimal amounts are needed. Intense sweeteners have played an important role in weight control, diabetes and dental health for over four decades. All sweeteners used in food production today are safe for daily consumption and have been approved by the national food safety authorities.

**Toothfriendly sweets**

Toothfriendly chewing gum and other sugar-free sweets are a safe alternative for substituting sugary treats between meals. Products which carry the “Happy Tooth” symbol do not contain fermentable ingredients or high amounts of erosive substances. Such products have to comply with a specific test regimen in order to get ‘toothfriendly’ approval. All toothfriendly-certified products have been tested in an in-vivo-measurement of the acid production of the human plaque-pH. This method was created in the 1970s and is known as “plaque-pH telemetry testing”. Besides sweets, certain medicinal products such as cough drops, vitamin chews, cough syrups and lozenges may be detrimental to teeth when consumed frequently or during night time. Today, most pharmacies stock a range of sugar-free alternatives. The majority of soft drinks contain one or more acids, most commonly phosphoric and citric acids. Consumers often mistakenly believe that sugar-free soft drinks are safe for teeth. Although diet sodas may not have sugar, their pH value may be lower than 3.5, and therefore, can also break down enamel. Besides water and unsweetened tea, only milk is recommended due to its relatively low cariogenicity and high calcium content.

**Conclusions**

Sugars are the biggest contributors to dental caries, and the level of sugar intake has become an issue of concern in the Middle East Area. To help patients reduce the frequency of sugar consumption, positive and realistic dietary advice is required. By replacing sugary snacks with toothfriendly alternatives – non-cariogenic and non-erosive sweets, chewing gum, medicinal products and beverages – the risk of tooth decay can be significantly lowered. Toothfriendly sugar substitutes such as isomalt, maltitol, sorbitol and xylitol play a major role by increasing the range of healthier food choices.

**References:**


Olofsson M. and Bratthall D. (2003). Diet measures for Prevention or Control of Dental Caries. Malmö University, Faculty of Odontology.


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Project Manager of non-profit association Toothfriendly International since 2004.

The association has its headquarters in Switzerland, but promotes caries prevention worldwide.

Toothfriendly International provides dentists, oral health educators, youth workers and teachers resources to promote the importance of toothfriendly dietary habits.

Website: www.toothfriendly.org