



Damaging Diets

How Weight Loss Fads and Popular Health Drinks Can Hurt Teeth

BY CLAIRE ALTSCHULER

At the start of every new year, millions of Americans resolve to improve their health, with weight loss, exercise, and healthier eating habits topping many resolution lists. According to the Marist Institute for Public Opinion, weight loss was the No. 1 New Year's resolution for Americans in both 2012 and 2013. Further, a 2011 study from the independent market research firm Marketdata Enterprises, "The U.S. Weight Loss & Diet Control Market," showed that Americans spent nearly \$61 billion on weight loss products in 2011.

Some of that money goes to companies that create and promote these products, which include juice cleanses, diet drinks, energy bars, sports drinks, and meal replacement shakes. Consumers are easily enticed by promises that make getting healthy seem both easy and delicious.

However, health professionals warn, many of these products fail to produce permanent weight loss or health benefits, and some of these diets and products actually may be harmful to a person's health—including his or her oral health.

In addition to depriving the body of essential nutrients, many fad diets push patients to consume beverages, foods, or supplements with highly acidic ingredients—which can be detrimental to teeth. As dentists know, repeated and unrelenting exposure to acidic food and drinks can cause erosion of both the enamel and the underlying dentin, leading to bulk tooth loss and, in severe cases, the need for endodontic therapy and even extractions.

As your patients resolve to improve their health in 2014, many may turn to popular diets or health trends. As health care providers, dentists should be prepared to recognize and treat the problems caused by these products, educate their patients about the dangers they may pose, and recommend food

and drink alternatives that will help them reach their health goals without damaging their teeth.

Weight-loss drinks and supplements

Kay Jordan, DDS, FAGD, of Marrero, La., knows just how damaging weight loss products can be on a patient's teeth. She encountered a problem in September 2012 when longtime patient Belinda Alonzo, 50, presented with

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—Belinda Alonzo, dental patient

cervical staining and multiple cervical caries, even around her crowns. Dr. Jordan was surprised to see damage similar to what is observed in chronic diet soda consumption—a habit she knew Alonzo did not have. "She had never exhibited anything like this before," Dr. Jordan says. She noted that Alonzo always had excellent oral hygiene habits and regularly visited the office for checkups and cleanings.

When Dr. Jordan asked Alonzo if she had made any changes to her diet, she discovered that her patient had begun using a dietary supplement program to curb her hunger and promote weight loss. Alonzo was using an appetite-suppressing powder, which she added to 12 ounces of water and drank once a day, 30 minutes before her lunch. Curious to see if it was the culprit of Alonzo's dental damage, Dr. Jordan researched the weight loss product online and found that it had a very high acid content. The product touted chlorogenic acid as one of its principle active ingredients, along with other ingredients like alpha lipoic acid and citric acid. Dr.

Jordan knew she had found the cause behind Alonzo's increased staining and caries, and she advised her patient to stop using the diet product immediately.

Before visiting Dr. Jordan, Alonzo says she noticed changes in her oral health. "I noticed a lot more food sticking at the gumline," she says. "Plus, I was having to floss more often."

Dr. Jordan showed Alonzo the extent of the recession at her gumline. "I could see, especially on my eye tooth, where

more of my tooth was exposed," she says. "I was shocked to discover that I was damaging my teeth when I thought I was doing something to improve my health." Since stopping the appetite suppressant, Alonzo says her symptoms did not deteriorate further, and she has not experienced any additional erosion.

Cleanses, juices, smoothies, and shakes

Consuming a low-calorie, liquid diet isn't a new health fad. The trend of using detox cleanses, juicing diets, or meal replacement shakes to spur weight loss and boost energy has been taking place for decades. Liquid detox diets first appeared in the 1970s and recently regained popularity after celebrities like Beyoncé embraced them for their weight loss needs. These diets, which claim to detoxify the body, improve health, and aid in weight loss, often require dieters to consume a highly acidic drink—a popular one used by many consists of lemon juice, maple syrup, cayenne pepper, and water—for at least 10 days.

Linda Chen, 62, of Ambler, Pa., decided to try a similar cleanse diet in September 2004 after seeing the dramatic weight loss of one of her relatives. The regimen called for a mixture of freshly squeezed lemon juice, orange juice, molasses, and wheat germ, and she was required to drink two cups of the concoction twice a day. But after several weeks on the cleanse, Chen began to experience tooth hypersensitivity. "I couldn't chew because of the pain," she says. Additionally, she noticed that all of her upper teeth looked like they had gotten significantly shorter, as if they had been filed down. She stopped the diet.

In 2005, Chen turned to Mohamed Bassiouny, DMD, a professor of restorative dentistry at the Temple University School of Dentistry in Philadelphia. When treating Chen, Dr. Bassiouny observed tooth surface loss, exposure of the cervical dentin, and reduced enamel translucency, in addition to the hypersensitivity. His clinical notes mentioned "a generalized pattern of tooth surface loss throughout the dentition, particularly the palatal aspects of the maxillary arch, and exposure of cervical dentin of the facial aspects of the dentition were revealed. ... All surfaces of the dentition were smooth, hard in consistency, and had normal tissue colors, although

enamel translucency was decreased."

Chen's hypersensitivity also was confirmed in Dr. Bassiouny's report: "Stroking the exposed dentin with a cotton roll elicited painful responses that lasted for a few minutes." Dr. Bassiouny bonded the exposed areas of the dentin, and now, nearly 10 years later, he has to repeat some of the treatment. He says Chen's case requires "frequent rebonding" to repair worn-out areas. Thus far, full crowns have been avoided because of the extensiveness of the damage to the dentition and the expense the patient would incur.

Unfortunately, the popularity of liquid detox diets has led to even more

Acidity in Sports and Energy Drinks/Diet Soda

The consumption of sports, energy, and diet soda drinks has increased over the years. However, some are unaware these drinks are highly acidic, with pH values closer to that of battery acid than pure water.



Sports and Energy Drinks/Diet Soda 2.50 to 3.50					
Rockstar 2.53	Hydr8 2.69	Diet Soda 2.70	Gatorade Rain 3.08	Fuze 3.09	Von Dutch 3.10
MDX 2.70	Powerade White 2.76	Powerade Red 2.77	Propel Mango 3.23	Rip It 3.25	Red Bull Sugar Free 3.27
Powerade Advance 2.77	Powerade Option 2.78	5-Hour Energy 2.81	Red Bull 3.37	Monster Assault 3.49	
Thirst Quencher 2.85	Powerade Blue 2.86	Gatorade Blue 2.92			
	Full Throttle Fury 2.94	Propel Grape 2.98			

Sources: "A Comparison of Sports and Energy Drinks—Physiochemical Properties and Enamel Dissolution," *General Dentistry*, May/June 2012; "Effect of Sweetening Agents in Acidic Beverages on Associated Erosion Lesions," *General Dentistry*, July/August 2012.

weight-loss cleanses, often called juice cleanses, which consist of various concoctions of fruits and vegetables that a person drinks throughout the day in place of meals. Proponents of these diet trends push juicing as a healthy way to lose weight while improving health and consuming necessary vitamins and minerals.

Other trends that have grown popular in recent years include meal-replacement shakes and smoothies, which can be either fruit/vegetable- or protein-based. Like other "health" beverages, these shakes and smoothies tend to be high in acid, sugar, and/or fermentable carbohydrates. If over-

consumed, fermentable carbohydrates can lower the mouth's pH and lead to demineralization and caries.

According to Christie Custodio-Lumsden, PhD, RD, CDN, a postdoctoral research scientist at the Columbia University College of Dental Medicine in New York, "If patients are having multiple juice drinks or meal replacement beverages throughout the day, they lose out on the benefit of adequate oral clearance time," which allows the pH of the oral cavity to rebound to a safe level. Most Americans, she adds, remain unaware that these so-called "health" drinks aren't as healthy as advertised.

Diet sodas

Meal replacement drinks aren't the only method that some Americans use to drop a few extra pounds. Many seeking to reduce calories often turn to diet soft drinks. Compared to regular, sugar-sweetened sodas, which contain about 140 calories per 12 ounces, zero-calorie diet drinks may seem like an attractive alternative. Unfortunately, carbonated drinks, whether sweetened with sugar or sugar substitutes, are often highly acidic (with a pH of approximately 2.7), which, dentists know, means that their chronic consumption can cause serious damage to oral health.

What many people don't know is that citric and phosphoric acids—which are used as flavor enhancers and preservatives in soda—can severely damage their teeth. According to Dr. Bassiouny, dentists are familiar with these acids' erosive ability because phosphoric acid is used in dental bonding. When used in dental procedures it "creates millions of pores in the enamel in as little as 10 seconds," he says.

All general dentists have patients who consume diet sodas, and many know that oral health problems arise when patients drink these acidic beverages all day long, effectively bathing the oral cavity in acid without a break. Dr. Bassiouny says high "volume, frequency, and duration" of soda consumption can lead to an oral health "disaster."

While volunteering for the Remote Area Medical/Mission of Mercy in the Appalachian Mountain states for several years, Dr. Bassiouny observed patients of all ages who presented with severe cases of erosion brought on by their habit of drinking excessive amounts of soda throughout the day. "I was horrified," he says. He examined children as young as 10 who had already had extractions, and many teenagers in the region need a full set of dentures prior to attending their first prom. A woman in her 50s who admitted to drinking diet soda all her life "had nothing left but black stumps," Dr. Bassiouny says. He cautions that patients who use diet soda as a way to curb their hunger may see similar effects if they consume the beverage in excessive quantities.

Marc Lowenberg, DDS, a cosmetic dentist who practices in Manhattan, says



he encounters many clients with oral health problems he attributes to diet sodas. "I've had adult patients with persistent gumline caries from drinking too much diet soda," he says. "For the most part, I would say people who abuse diet sodas are not cognizant of the fact that they're increasing the acid levels in their mouth, and that acidity is what helps promote erosion and tooth decay."

Poonam Jain, BDS, MS, MPH, director of community dentistry at the Southern Illinois University School of Dental Medicine in Alton, Ill., agrees that lack of awareness is a problem. She often encounters patients who believe they are improving their health by switching from sugar-sweetened drinks to diet ones, and these patients are surprised when they learn they have erosion and caries. "They'll always say, 'But I brush my teeth,'" she says. "Just because there's no real sugar, people think these drinks are fine, but nothing could be further from the truth. People don't take the acidity into consideration."

Energy and sports drinks

Inundated with sophisticated marketing campaigns, many people have eschewed soda in favor of energy and sports drinks—drinks they believe are healthier alternatives. According to the Jan. 29, 2013, report "Energy Drinks and Shots: U.S. Market Trends," from Packaged Facts (a division of Market Research Group LLC), energy drinks are the fastest-growing segment of the beverage industry, with sales of more than \$12.5 billion in 2012. They are especially popular among teenagers and young adults, who believe the drinks help them stay awake or perform better physically. Many add them to their diet when they start ambitious exercise regimens. Whether they are diet or sugar-sweetened, these drinks tend to be highly acidic.

Dr. Jain recalls a young patient who proudly declared that he had stopped drinking soda in favor of sports drinks. Unfortunately, his drink of choice contained high levels of citric acid, making it just as damaging to his oral health.

She says people tend to consume these drinks throughout the day,

increasing their mouth's exposure to acid. "Who drinks a big bottle in one gulp?" she asks. "It takes a while to sip through it and, all that while, the acid is in your mouth."

In her study "A Comparison of Sports and Energy Drinks: Physiochemical Properties and Enamel Dissolution," published in the May/June 2012 issue of *General Dentistry*, Dr. Jain observed that both beverages were erosive. However, she found that energy drinks, with a titratable acidity of 5.9 to 14.5, proved to be significantly more damaging than the sports drinks, whose titratable acidity ranged from 2.9 to 4.8. According to the study, the percent weight loss of enamel exposed to energy drinks for five days was 3.1 percent, compared to 1.5 percent for sports drinks. "It takes a lot more to neutralize the pH of saliva after exposure to energy drinks," she says. "As a result, it's not just caries we see, but loss of tooth structure."

According to the American Beverage Association (ABA), though, drinks of any kind are not the culprit for dental decay. A May 2, 2012, ABA press release regarding Dr. Jain's study states, "It is irresponsible to blame foods, beverages, or any other single factor for enamel loss and tooth decay (dental caries or cavities). Science tells us that individual susceptibility to both dental cavities and tooth erosion varies depending on a person's dental hygiene behavior, lifestyle, total diet, and genetic makeup."

Dr. Jain notes that energy drinks have become a global problem. "A lot of good studies from around the world have shown that erosion is on the rise because of overconsumption of these acidic beverages," she says.

Additional dietary culprits

Water is one of the most beneficial drinks for overall health, and nutritionists often recommend it to dieters to help them feel full and reduce cravings. "Dieters will often make an effort to drink more water, which sounds really good," says Richard Wittberg, PhD, executive director of the Mid-Ohio Valley Health Department. But that has begun to change, he says, as people flavor their water with substances that contain citric acid.

In recent years, companies producing bottled water in a crowded and competitive field have been adding flavors to make their products more appealing to consumers. Some brands are even producing carbonated versions, advertising them as healthy alternatives to soda.

And some brands have introduced flavor drops, bottles of artificial flavorings that consumers add to water themselves. Like sodas, energy drinks, and sports drinks, these bottled water additives contain high levels of acid, which means they also can be harmful to oral health—a fact that many patients are unaware of.

And it's not just beverages that are a cause for concern. Other ingredients in a person's diet, even seemingly innocuous ones like salad dressing, can be detrimental to oral health when consumed too often. Samer Shamoon, DDS, MAGD, of Berkley, Mich., encountered this problem when one of his especially health-conscious patients suddenly presented with significant erosion. "All of the inside surfaces of his teeth were smoothed down," Dr. Shamoon says.

At first, he thought his patient might be bulimic. Upon further discussion, however, he discovered that his patient had begun an all-salad regimen, and that the salads were dressed with a highly acidic vinegar, which Dr. Shamoon identified as the cause of the erosion. He advised his patient to stop the diet to prevent further damage.

The challenge of diagnosis

The oral health effects of some weight loss products and health trends may cause difficulty during diagnosis and treatment planning. For dentists, one of the principal challenges in treating erosion from these substances is early detection. As a complicated, multifactorial event, erosion can be difficult to detect visually, especially in its early stages, when changes may be subtle.

"We don't diagnose erosion very well," says David Albert, DDS, MPH, director of community health and associate professor of clinical dentistry at the Columbia University College of Dental Medicine. He notes that numerous factors can work together to cause tooth structure loss. For example,

the erosion from acidic beverages may be aggravated by abrasion, bruxism, or abfraction. "Dentists often misdiagnose bruxing because they see wear and it looks like the result of occlusal habits, but often it's the erosion that comes first, and then the patient, trying to find a comfortable place to bite, starts grinding." In these instances, Dr. Albert adds, the grinding is an attempt to relieve pain rather than a response to stress.

In his article "Effect of Sweetening Agents in Acidic Beverages on Associated Erosion Lesions," published in the July/August 2012 issue of *General Dentistry*, Dr. Bassiouny notes, "Identifying these erosion lesions can be challenging due to their diametrically diverse clinical manifestations and the illusory nature of their features." When it comes to sodas, for example, generally the lesions associated with sugar-sweetened acidic beverages resemble those in dental caries, while those attributed to diet drinks look like those associated with mechanical wear and tear. These lesions, he says, also are comparable in the way they develop, how they advance into the structures of the tooth, and the additional problems they cause, making it difficult to distinguish between the two.

Despite challenges, there are some important characteristics that can help dentists identify lesions' etiology. According to Dr. Bassiouny, erosion lesions caused by acidic drinks, for example, can be distinguished from caries caused by microbial organisms in the presence of sugar. Erosion lesions tend to affect "every part of the tooth and every section of the dentition," whereas caries often present in a more localized way, usually appearing on the pits and fissures of biting surface of a tooth, at the gumline, and/or between the teeth. The most striking difference between erosion lesions associated with regular and diet soda consumption, Dr. Bassiouny says, is in the lesions' color. Although he two erosion lesions sometimes look alike, lesions caused by diet beverages tend to display whitish enamel and dark yellow dentin, while lesions caused by regular, sugar-sweetened soft drinks are more brown in color (though the enamel color could be similar).

Preventive care, patient education

Diet and its effects on dental health are a growing concern for dentists, many of whom have witnessed the destructive effects of popular diet fads and drinks on their patients' teeth. According to Dr. Albert, it's important to discuss with patients just how some of these diet fads and drinks can impact their teeth *before* the damage is done.

He urges dentists to be aware of a patient's potential use of these products around specific times in their lives—cheerleading tryouts, a 10-year school reunion, an upcoming wedding—times when weight loss might be a dietary motivator. Those are the best times, says Dr. Albert, to counsel patients and discuss the potential impact of dietary changes or use of weight loss products. For example, a dentist may want to discuss sports drinks with a student who recently joined a sports team, or energy drinks with a college freshman who is getting little sleep. "It's important to have the conversation," he says.

Further, because of the challenges associated with visual exams, experts encourage dentists to use detailed intake forms that include questions about diet and health habits for all new patient visits and at every routine checkup with regular patients. In addition, tactful questioning, especially when new lesions appear, can help identify any problems at an early stage.

If a dentist does learn that a patient's diet includes highly acidic food or drinks, whether related to dieting products or not, the dentist can help that patient avoid serious problems by providing information and advice. Because a surprising number of patients are unaware of the dangers that acids pose to their teeth, telling them about these risks and suggesting alternatives, such as switching from diet soda to plain water, can go a long way to preventing damage and improving oral health. Further, general dentists who are educated about these various diet methods and products will have a better idea of what their patients are actually consuming.

Custodio-Lumsden suggests general dentists work closely with local dietitians

to help educate patients about the overall impact of their weight loss efforts on their health. "There's been a movement in recent years toward more interdisciplinary collaborations and referrals," she says. "Dietitians often recognize oral health issues and can make appropriate referrals to dentists, and oral health care professionals are being encouraged to start recognizing when their patients may need nutritional counseling and when they should be referred to registered dietitians." The hope, she says, is that these efforts will result in people consuming more balanced diets and enjoying better overall oral health.

The new year ushers in a new wave of weight loss, exercise, and healthy resolutions for many. However, when individuals turn to quick-fix products and health fads, serious damage may occur. As stewards of their patients' oral health, dentists must be aware of these weight loss and health fads, and their impact on teeth. By working to treat and prevent these effects, dental professionals can help their patients stay healthy while staying true to their New Year's resolutions. ♦

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For more information on how citrus can damage teeth, read Dr. Bassiouny's case report, "Clinical Observations of Dental Erosion Associated With Citrus Diet and Intake Methods," in the January/February 2014 issue of *General Dentistry*.

