Sugar and Spice Yet Today Everything Is Not So Nice

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The global obesity epidemic is a major concern in developed and developing countries not only for its impact on public health but also the escalation of health care costs that accompanies it (WHO, 2005; Tsigosa, 2008). Today more than ever, organizations, researchers, governmental agencies continue to step up their efforts on all fronts to identify possible solutions to the epidemic. In many communities the efforts tend to focus on eating less (portion control), moving more (walking or other similar activities) and eating better (The White House, 2010; Widhalm, and Fussenegger, 2005). The eating better part of the equation seems to bring forth areas where agreement is not 100%. Most scientific thought leaders do agree on encouraging a reasonable consumption of fruits and vegetables, lean proteins, low fat dairy, and whole grains to obtain a balanced lower calorie intake lifestyle but there seems to be less agreement on decreasing consumption of total fats (which specific fats) and sugars. With sugars being an area where those involved in scientific research, government regulators and industry have yet to decide on the vision for recommendations for the future e.g. the type and the amount of caloric sweeteners and how to handle concurrent recommendations on non-caloric sweeteners.

Three Major Types of Sugars: Sucrose, Fructose and Glucose

Humans find pleasure in the sweet sensation (Desor et al., 1973). It appears to be innate with the monosaccharides known as glucose and fructose and the disaccharide known as sucrose, found in sugar cane, sugar beets and fruits. For centuries and across the globe man has continued to extract, concentrate and crystalize sucrose for consumption as a sweet powder or as an ingredient to make sweet desserts, refreshing beverages, sauces, and other processed food products. It is estimated that 168 million tons of sucrose is produced in the world today (United States Department of Agriculture, 2011). That figure is down when compared to the 1970s, due to the introduction of high fructose corn syrup (known as isoglucose or glucose-fructose syrup in the European Union) and most commonly used (80% of production) in the United States.

Use of high fructose corn syrup (HFCS) escalated in the United States due the acceptability as a sucrose replacement in food beverages and food products but also due to a lower price when compared to sucrose. The lower price in the United States is the result of corn subsides, sugar tariffs and quotas (Pollan, 2003; United States Department of Agriculture, 2004). It is interesting to note that HFCS consumption has increased as obesity has escalated in the United States and often has been villianized as the cause of the obesity epidemic, yet as of today this is only an association and there is no scientific research to demonstrate a cause
and effect relationship (Bray, 2007). However, it should be noted that this is an active area of research and many healthcare providers, nutritionists, consumer groups, public health officials believe that across the globe, individuals are consuming too much sucrose, fructose and glucose. It is well known that sugars provide energy but provide no vitamins, minerals, dietary fiber or protein. Additionally, it has often been suggested that sugars can promote obesity, tooth decay, and, in people with high triglycerides, heart disease. In fact, it is interesting to note that in 2009 the American Heart Association issued a scientific statement on “Dietary Sugars Intake and Cardiovascular Health.” In this document it states: “A prudent upper limit of intake is half of the discretionary calorie allowances, which for most American women is no more than 100 calories per day and for most American men is no more than 150 calories per day from added sugars.” That is about 6 teaspoons for females and 9 teaspoons for males per day (Johnson, et al., 2009).

Small or limited amounts of sugars are safe and can be added to a typical diet for enjoyment and pleasure. Yet, it appears that some consumers struggle with the concept of portion control and not just with sugars. Some individuals find that sugar is “addicting” and find it difficult to curtail their intakes. Again, this remains and continues to be an active area of research where answers may lead us to knowledge, which may be helpful in our continued fight against obesity, heart disease and diabetes (Avena, 2008). Related to diabetes, small and modest amounts of fructose do not boost blood glucose levels, making the sweetener attractive to individuals with diabetes, however, increased levels increase triglycerides in the blood and thereby increase the risk of heart disease and therefore should be avoided whenever possible. Finally, it appears that large amounts of fructose may play a role in metabolic disorders and if consumed on a regular basis may affect levels of such hormones as insulin, leptin, and ghrelin, that regulate appetite, thereby contributing to weight gain and obesity. However, much more exploration is needed in this area before we have a definite answer (Bray, 2007).

**Not All Sugars Are Created Equal**

Not all sugars are sweet; in fact, some are barely sweet at all. On a weight-by-weight basis, fructose is the sweetest sugar substance followed by sucrose, glucose and lactose (Bray, 2007). Lactose is the sugar found in milk. In humans, our digestive tract produces an enzyme known as lactase, which has the ability to hydrolyze the lactose into two monosaccharaides, glucose and galactose. Among some populations groups (notably but not exclusively Asians and Blacks) are individuals genetically deficient in lactase and therefore are known to be lactose intolerance. If these lactose intolerant individuals consume lactose found in milk, cheese or ice cream they often have severe gastrointestinal symptoms of bloating, excess gas production and flatulence. Limiting their intake or avoidance of lactose-containing products eliminates these symptoms. Sometimes these individuals may purchase products where the lactose has been removed or decreased through the use of technology (ultrafiltration and specific absorption) or to lower the lactose in the final product through the use of the addition of the enzyme lactase.

**Beyond Sugars: Other Sweeteners**

There are other substances that are sweet
beside sugars. Artificial and natural sweeteners are used in beverages, candies, chewing gum, yogurts, and many other products to provide sweetness without the calories. The major sweeteners in this arena include acesulfame-potassium, aspartame, cyclamate, saccharin, rebiana (stevia leaves), and sucralose.

Given the above, there are a number of unanswered questions that rest in the minds of many consumer groups, scientists and regulators. For example, cyclamates are banned for use in the United States due to its possible ability to cause cancer in animals yet it is approved for use in 55 other countries around the world (Kellen, 1977). So is cyclamate safe or not safe? What about the long-term usage of all of these types of sweeteners in our diets, especially in combination? Are their any special risks to toddlers and children that we should be concerned about? Do artificial and natural sweeteners increase, decrease or remain neutral in the amelioration of obesity? What is the effect of these sweeteners on the brain and neurotransmitters and do they enhance the desire for the sweet taste and resulting in overeating?

Many companies imply, or at least in the minds of the consumer, that these no calorie sweetener ingredients may be helpful in weight loss and weight maintenance. The fact is that losing weight is difficult, and people need to make a real concerted effort to eat fewer calories, move more, change their mindless eating habits and eat better. It appears that these sweeteners can make the challenge a little more pleasant and whether or not they may be helpful in the weight loss journey or maintenance lifestyle have yet to be proven. Controversies swirl around most of these food additives sweeteners and will continue especially as the consumer remains distrustful and separate from science and technology. The challenge is before us; let us meet it.

Bibliography


