

Understanding Sugar

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Abstract

Out of the many foods that are on the most vilified list sugar surely shares a place at the very top and has been a target by many health professionals for many decades. Out of all of the many allegations that surround this supposedly dreadful and harmful, addictive substance, most of them don't hold the weight that they seem to. Much of the common beliefs surrounding this sweet substance are not as factual as one may think and weigh more heavily on perceptual bias than truth. In the end there are many wonderful benefits of its consumption regardless of its type. While moderation is in order for this as well as any other substance its benefits along with a smart consumption plan may yield for better health than omitting it altogether.

Understanding Sugar

On the most vilified foods list sugar likely ranks within the top 5. Since the early pioneer movement in health in America led by Paul Braggs on to the present this sweet substance has been under heavy fire and condemnation. Between the health activist with a pure genuine concern for the well being of others and the companies with their vested interests the heavily one sided arguments for sugar have left the consumer in the dark about the truth. Sugar isn't the scourge it is often touted to be; it is often misunderstood that it can be beneficial to your health.

Methods

The LIRN data base was used along with Google to acquire journals and articles that provided the most well rounded information on the subject of sugar.

Results

The greatest driving force for the vilifying of sugar lies in the high demand of its consumption by the consumer. Although, much of that consumer sugar consumption is more subtle rather than intentional. According to Haas (2012) statistics tell us that:

- In 1970, Americans consumed 72 pounds of sugar per person a year.
- Today, Americans consume 100 pounds of sweetener per person per year.
- The average person consumes 22 teaspoons of sugar a day.
- The average child eats 32 teaspoons per day (pg. 136).

The subtlety lies in part on the manufacturers of highly processed products that are offered cheaply and abundantly to the consumer in which can be found on the shelf at the store or ordered at a fast food or regular restaurant. Unknown to the consumer what lies in much of those cheap and widely available extremely processed products passed off as real food are many unfamiliar names of highly processed sugar such as:

- Evaporated Cane Juice
- Evaporated Cane Sugar
- Agave Nectar
- Fruit Juice
- High fructose Corn Syrup
- Dextrose
- Sucrose
- Honey
- Glucose
- Lactose
- Maltose
- Galactose

Accusations of Addiction

According to Hyman (2013):

David Ludwig, author of *Ending the Food Fight*, and his colleagues at Harvard, in a very sophisticated study, showed that foods with more sugar, foods that raise blood sugar even more than table sugar such as white flour, white potatoes and refined starch have what is called a high glycemic index, trigger a special region in the brain called the *nucleus accumbens* that is known to be "ground zero" for conventional addiction, such as gambling or drug abuse (para. 3).

In conjunction to this it has been noted that at least two thirds of Americans are trying to reduce their weight and are more conscious about their health but “Such efforts are complicated by the fact that consumers are tempted by products such as potato chips, cookies, crackers, ice cream,

alcohol, caffeinated products and soft drinks” (Jain, 2012, Introduction, para. 1). Many consumers seem to be very aware of the power of their cravings for such junk foods and the consequences that follow; in order to pacify such instead of completely forgoing those cookies or those soft drinks they choose to purchase a smaller container or package of that particular product (Jain, 2012). According to Hyman (2013) there was a study conducted to demonstrate the addictive effects of sugar on the body:

They took 12 overweight or obese men between the ages of 18 and 35 and gave each a low sugar or low glycemic index (37 percent) milkshake, and then, four hours later, they measured the activity of the brain region (*nucleus accumbens*) that controls addiction. They also measured blood sugar and hunger. Then, days later, they had them back for another milkshake. But this time they switched the milkshakes. They were designed to taste exactly the same and be exactly the same in every way except in how much and how quickly it spiked blood sugar. The second milkshake was designed to be high in sugar with a high glycemic index (84 percent). The shakes had exactly the same amount of calories, protein, fat and carbohydrate. Think of it as a trick milkshake. The participants didn't know which milkshake they were getting, and their mouth couldn't tell the difference, but their brains could. Each participant received a brain scan and blood tests for glucose and insulin after each version of the milkshake. They were their own control group. Without exception, they all had the same response. The high sugar or glycemic index milkshake caused a spike in blood sugar and insulin and an increase in reported hunger and cravings four hours after the shake. Remember -- exactly the same calories, sweetness, texture and macronutrient content (para. 7).

Just taking such information at face value would seemingly be solid grounds to label sugar as a villain that many need to be liberated of and rightfully rank it no better than a drug.

Accusations of Behavioral Problems

Aside from being likened to an addictive drug many consumers see sugar as the culprit behind behavior problems especially concerning children. According to Kinsbourne (1994):

In one report, 9 of 55 hyperactive children on diets that excluded sugar had an adverse response when sugar was reintroduced . But sugar ranked only 18th among the many dietary components incriminated in this report. Given the largely negative findings and the failure of the occasional significant outcome to be confirmed in subsequent studies, it appears that any adverse effect of sugar is by no means as severe or as prevalent as uncontrolled observation and opinion would suggest. Specifically, there is no evidence that sugar alone can turn a child with normal attention into a hyperactive child (para. 5).

In his final conclusion on nutritional studies and behavior such as this one with sugar and hyperactive children Kinsbourne had this to say:

Sugar clearly *does not induce psychopathology* [emphasis added] where there was none before, but it may on occasion aggravate an existing behavior disorder. Sugar-free diets can be burdensome and socially inhibiting, and they should not be endorsed purely on the basis of anecdotal evidence. The potential usefulness of such a diet for a particular child should first be determined by putting the child on a temporary elimination diet and acquiring behavior ratings from several observers (para. 7).

Furthermore according to Wolraich et al. (as cited by Flora & Polenick, 2013):

The results of this study do not support the hypothesis [emphasis added] that a diet high in either sucrose or aspartame adversely affects the behavior or cognitive functioning of

children.... The findings were negative even though the older children were selected because their parents believed them to be sensitive to sugar and even though the children in both groups ingested substantial amounts of the sweeteners. ... We conclude from this carefully controlled nine week study that neither sucrose nor aspartame produces discernible cognitive or behavioral effects in normal preschool children or in school-age children believed to be sensitive to sugar (The Sugar – Hyperactivity Myth, para. 4).

Also a study conducted by Barchorowkis et al. (as cited by Flora & Polenick, 2013) concluded the following after juveniles were given a sugar filled or a sugar free breakfast and a behavior assessment hours later:

Stated succinctly, there was no evidence of a negative effect of sucrose ingestion on performance. The overall pattern of results, across three subject samples and numerous behavioral domains *provided no support for the contention that sucrose ingestion compromises behavior.* [emphasis added] Moreover ... the sucrose breakfast was associated with *improved*, rather than impaired, performance. ... Contrary to popular lore, those delinquents described by their teachers as the most disruptive and behaviorally disturbed demonstrated *better* performance after the sucrose than after the no-sucrose breakfast (The Sugar – Hyperactivity Myth, para. 7).

Accusations of Obesity and Disease

Also commonly found in the headlines is the link between sugared drinks such as soft drinks and obesity and diabetes. According to Bronwell, Schwartz & Vartanian (2007):

In a meta-analysis of 88 studies, we examined the association between soft drink consumption and nutrition and health outcomes. We found clear associations of soft drink intake with increased energy intake and body weight. Soft drink intake also was associated

with lower intakes of milk, calcium, and other nutrients and with an increased risk of several medical problems (e.g., diabetes).

The main focus of this meta-analysis was on the comparison between the effects of beverages laden with sugar diet and artificially sweetened beverages (Bronwell, Schwartz & Vartanian, 2007)

According to Malik et al. (2010):

Based on data from these studies, including 310,819 participants and 15,043 cases of type 2 diabetes, individuals in the highest quantile of SSB intake (most often 1 – 2 servings/day) had a 26% greater risk of developing type 2 diabetes than those in the lowest quantile (none or <1 serving/month) (relative risk [RR] 1.26 [95% CI 1.12-1.41]). Among studies evaluating metabolic syndrome, including 19,453 participants and 5,803 cases, the pooled RR was 1.20 [1.02-1.42] (Results, para. 1).

Further correlation between increased weight gain in sugar consumption are seen in a meta-analysis conducted by Mallard, Mann & Morenga (2012):

30 of 7895 trials and 38 of 9445 cohort studies were eligible. In trials of adults with ad libitum diets (that is, with no strict control of food intake), reduced intake of dietary sugars was associated with a decrease in body weight (0.80 kg, 95% confidence interval 0.39 to 1.21; $P < 0.001$); increased sugars intake was associated with a comparable weight increase (0.75 kg, 0.30 to 1.19; $P = 0.001$). Isoenergetic exchange of dietary sugars with other carbohydrates showed no change in body weight (0.04 kg, -0.04 to 0.13) (Results, para. 1).

The Benefits of Sugar

Sugar due to it being vilified as public enemy number one, often does not receive its proper credit on the dietary and nutritional stage. However, it is important to first focus on one of main reasons for this such as has briefly been discussed already. The misguided labeling of

sugar by manufactures seeking profit and forfeiting the facts has blindsided many into believing that there is no real benefit in sugar consumption and it must be avoided. This can be clearly seen in the labeling misconception of evaporated cane juice or evaporated cane sugar. Basically many of the purported brands parading around evaporated cane juice or sugar are not much different than the exaggeratedly processed white sugar that is nearly devoid of all its nutrient factor (McCaffrey, 2010) As the name suggests evaporated cane sugar is nothing more than sugarcane juice that has been evaporated away leaving behind sugar crystals still brimming with all of their vital nutrients but that is certainly not the case (McCaffery, 2010). Also according to McCaffery (2010):

To understand why this wrongly called "evaporated cane juice" is not really healthy, you must first understand why a natural sugar cane *is* healthy and nourishing. The natural sugar cane is brimming with vitamins, minerals, enzymes, fibers, and phytonutrients that help the body digest the naturally occurring sugars. The minerals required to digest sugar are calcium, phosphorous, chromium, magnesium, cobalt, copper, iron, zinc and manganese. It also contains vitamins A, C, B1, B2, B6, niacin, and pantothenic acid, which work synergistically with the minerals to nourish the body (para. 6).

In discussing the wonderful effects of sugar in its unadulterated form such as that of sugar cane juices the benefits are as follows as discussed by McCaffrey (2011):

- It cures a sore throat, cold and flu.
- Unlike table sugar, it has no simple sugars. Diabetics can therefore enjoy it without worrying about soaring blood sugar levels (those with type 2 diabetes should still have limited sugarcane juice).

- It provides glucose to the body, burned by the muscles to provide the body natural energy. It re-hydrates the human body fatigued from heat and physical activity. It's known to boost performance in athletes and manual laborers.
- It's recommended for fevers which cause great protein loss from the body. Liberal consumption of sugarcane juice provides the body with protein during febrile disorders. It also brings down high body temperatures during fevers.
- It's good for the digestive system and also helps with constipation because of its high potassium content.
- It has a wide range of compounds in addition to sucrose which bestows it with wound healing properties and strengthens the immune system.
- Regular intake of sugarcane juice strengthens the stomach, kidneys, heart, eyes, brain and sex organs (para. 6).

Also according to McCaffey (2011) sugarcane:

also improves kidney function by clearing the urinary flow and is believed to be a good treatment for fevers, as it boosts the body's protein levels. An Australian study also showed that it stabilizes blood sugar levels and promotes weight loss in obese rats. Numerous studies since the 1930's have shown that sugarcane juice has a protective effect against tooth decay, owing to its high mineral content (para. 5).

Some of these benefits can also be achieved from granulated sugars that are truly derived from evaporated cane juice such as Organic Whole Cane Sugar or Sucanat and Rapadura (known as Raspadura in Panama) considering that they “do not separate the molasses from the sugar crystals and therefore contain most of the nutrients, including the polyphenols, that are found in the raw sugarcane juice” (McCaffrey, 2011). Although according to McCaffrey (2010):

Other types of so-called "natural" sugars on the market like Muscavado, Turbinado, Demarara, wrongly called "Evaporated Cane Juice and Evaporated Cane Sugar", Sugar in the Raw, and Organic Raw Sugar are all refined, though not as much as white sugar. They are all boiled, dehydrated into crystals, then spun in a centrifuge so the crystals are separated from the molasses. The clarifying process is usually done with chemicals, although sometimes through pressure filtration. The crystals are then reunited with some of the molasses in artificial proportions to produce sugars of varying colors of brown (para. 18).

Although Sucanat, Rapadura and Organic Whole Cane Sugar are truly healthy sugars if your palate doesn't like the heavy taste of molasses you are much better off choosing Muscavado, Turbinado or Demarara which are at least many steps above the highly processed white sugar and contain a fair amount of mineral components but not enough to boast of serious health claims.

However the many wonderful benefits of sugar don't end even with just healthy types versus highly processed types. Polenick and Flora (2013) make three very powerful points that are not spoken much about inconsideration of the risks of sugar consumption:

- To this point, what is *known* about the effects of sugar consumption on human behavior and performance is that *sugar consumption, even in high amounts, does not contribute to* [emphasis added] hyperactivity, inattention, juvenile delinquency, reductions in cognitive performance, or other behavior problems in children or adults. Instead, a high level of glucose, or sugar, consumption *actually improves* [emphasis added] athletic, academic, and cognitive performance, and may enhance self-control. Sugar consumption may reduce aggressive behavior, and sugar
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consumed during breakfast and in afternoon snacks improves performance during a wide range of activities.

- Although it is safe and arguably best for one's health to consume sugar in moderation, erroneously attributing sugar as a cause of hyperactivity, inattention, and other behavioral or performance problems may be harmful by *leading individuals to ignore the actual causal factors of performance deficits*. [emphasis added] As a result, scientifically proven behavioral treatments may be delayed or never implemented, thus potentially decreasing the likelihood that meaningful functional improvements will occur. Moreover, restriction or elimination of sugar from the diet may be unintentionally counterproductive, decreasing performance below what could have been obtained had sufficient glucose been consumed.
- For individuals of all ages, *research has demonstrated that sugar consumption has numerous beneficial effects* [emphasis added] on human behavior and performance. These effects may be most apparent when sugar is consumed shortly before engaging in athletic, academic, or cognitive activities. While future studies will further expand our knowledge of these performance benefits, the current literature suggests that sugar consumption can play an important role in the successful execution of a wide variety of effortful and demanding tasks (Conclusion).

Discussion

It is clearly evident that sugar has gotten a bad rap much more due to bias, opinion and misunderstanding than on proven scientific evidence. The greatest problem lies in studies such as the one referenced by Mark Hyman on the obese people with milk shakes. Such a study

clearly does not represent reality in which people do not generally just consume such for a day's meals. Neither does this study account for the lack of or inclusion of exercise or other stress factors that go into the choice of foods laden with sugar. The sole emphasis on such studies is on the bias that sugar is the cause rather than a component among many others that lead to a health problem. The fallacy of such an approach is clearly seen in the studies conducted on hyperactive children as well as juveniles and the lack of evidence to support sugar being a factor in their behavioral dysfunctions. Also most of these studies fail to include the fact that the metabolic effects of sugar regardless of it being extremely processed differ in the presence of varying nutrient content such as fiber and other minerals, whose absence either increase or decrease its metabolic stimulation. Failure to scientifically provide a conclusion on sugars' effects with the absence of such is clearly misleading and lacking in evidence to draw any type of correlative relationship to it and physical ailments and disease. As has been proven scientific evidence backs up the positive benefits of sugar. While studies may prove as in the one referenced by Mark Hyman (2013) that sugar has a direct impact on the "nucleus *accumbens* that is known to be "ground zero" for conventional addiction" is not conclusive enough to draw correlation between sugar consumption and drug addiction. Clearly things such as all of the various stressors involved which also play the greatest role in any other substance abuse are considered to be a lesser factor. Addictions are a result of an individual dealing with various life stressors but the object of addiction is not the cause but the result of such and the same can be said for sugar. Therefore such arguments against sugar consumption as a drug that an individual needs rehabilitation from is erroneous and very misleading as it deliberately leaves out all of the other dominating factors that are involved. However, in the case of sugar marketing deception plays

one of the largest roles aside from consumer life stressors, which easily provide the foundation for the vilification of sugar consumption.

In conclusion the root of this problem with the vilification of sugar lies greatly in a misunderstanding and understatement of the various factors that lead to the overall diseases and other health risks it is wrongfully tainted for. Such misleading information as is put forth by many nutritionists and health professionals places the consumer in a situation in which to fear a beneficial source for energy and wellbeing if taken both in moderation and with some thought. Sugar is a food and can be over consumed as well as any other food but it is not worse or better than how it is used in the diet taking into consideration individual health history. Health professionals would do well to place greater emphasis on manufacturer labeling deception of sugar free, fat free and such like products and emphasize greater consideration of why an individual craves sugar as opposed to just out right advising against its consumption under misleading allegations.

References

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