Blog post:

How Sugar Can Affect Your Joints

The effects of excess sugar consumption on joint health are manifold. In this article, we will explore the different ways in which a diet high in sugar and refined carbohydrates could negatively impact your joints and other related structures such as tendons and even bones.

The Basics

Carbohydrates are one of three macronutrients that are part of the human diet, the other two being protein and fat. Depending on different factors such as food availability, cultural and food preference, and physical activity, as much as 50–60% of a person's daily calories may come from carbs.[1,2]

The body can readily obtain energy from carbohydrates. They are converted into glucose—i.e., sugar—in the body and stored as a compound called *glycogen* in tissues such as liver and muscle. During fasting or when energy requirements increase, the liver and muscle can break down glycogen so that the body has more sugar available to meet its needs.

So, sugar and other carbs aren't bad per se. In fact, if we maintain a healthy balance between calorie intake and energy expenditure, we will not only meet all of our nutritional requirements, but also maintain a healthy body weight and avoid disease. However, if carbs are consumed in excess, this can create a host of metabolic problems.

Too Much of a Good Thing: The Dilemma of the Western Diet

Our ancestors worked hard for calories, including calories from carbs. Obtaining sugar from sources like fruit or honey wasn't as easy as it is today. It was an endeavor that might have required them to forage for miles, climb trees, or get stung by a swarm of bees.

Today, it's a very different story. The store you regularly shop from may be stocked with thousands of calories, many of which come from highly processed foods, including carbohydrates. Some of the most visible food items in American supermarkets are also some of the most calorie dense. Think about the boxes of cereal, the sugar-sweetened beverages, or the baked goods. Sadly, this is not by chance, but by design.

And this is not the case only in the US. The global supply of food has been altered and cheap, palatable, convenient, energy-dense foods are now readily available worldwide. This phenomenon may be, in part, responsible for the dramatic rise in obesity.[3] This leads us into the next topic, how excess sugar consumption may result in poor health, including joint health.

Excess Sugar and Joint Health

An excessive consumption of sugar and refined carbohydrates can dramatically increase a person's daily intake of calories. Foods that contain high amounts of these compounds tend to be very calorie dense. This means that even a relatively small amount, for example, a couple of muffins or a can of soda, can pack a large number of calories. These excess calories, over time, may contribute to conditions such as obesity and diabetes. Now we're getting into joint health territory.

When you think about excess calories, the first thing that may come to mind is weight gain. This is not too far from the truth. Over time, a consistent intake of calories above our daily requirements may lead to excess weight. The resulting **overweight or obesity** can lead to structural joint damage. This means that bearing that extra weight can accelerate the wear and tear on joints. In fact, studies have shown that overweight and obesity are associated with many conditions, including a type of chronic joint inflammation called osteoarthritis.[4]

Diabetes is another potential long-term effect of excessive calorie intake. If a person develops diabetes, their joints may be at risk in the long run. Long-standing diabetes can affect joint health in different ways.[5,6] Excess sugar in the blood leads to the production of compounds called "advanced glycation end products" (AGEs). AGEs can accumulate in tissues present in joints such as bone and tendons.[7,8] They may also play a role in small blood vessel damage and contribute to inflammation. The end result of this can be musculoskeletal complications.

Conclusion

Sugar and other carbs aren't bad per se. However, as with anything, an excess consumption can lead to a slew of metabolic complications. Eating too many foods high in refined carbohydrates can lead to an excess calorie intake over time. This, in turn, can translate into overweight or obesity and increase a person's risk of developing diabetes. It is these metabolic complications that can then cause joint problems through the mechanisms discussed in this article.

Eating in moderation can help you maintain a healthy body weight and thereby preserve joint health. And remember, always choose complex carbs over refined ones.

Prepared by:

Samuel Sarmiento, MD, MPH, MBA
Founder & CEO
Juniper Life Sciences
San Diego, CA

References

1. Abete I, Astrup A, Martínez JA, Thorsdottir I, Zulet MA. Obesity and the metabolic syndrome: role of different dietary macronutrient distribution patterns and specific nutritional components on weight loss and maintenance. *Nutr Rev.* 2010;68(4):214.
2. Freire R. Scientific evidence of diets for weight loss: Different macronutrient composition, intermittent fasting, and popular diets. *Nutrition.* 2020 Jan;69:110549. doi: 10.1016/j.nut.2019.07.001.
3. Swinburn BA, Sacks G, Hall KD, McPherson K, Finegood DT, Moodie ML, Gortmaker SL. The global obesity pandemic: shaped by global drivers and local environments. *Lancet.* 2011;378(9793):804.
4. Guh DP, Zhang W, Bansback N, Amarsi Z, Birmingham CL, Anis AH. The incidence of co-morbidities related to obesity and overweight: a systematic review and meta-analysis. *BMC Public Health.* 2009 Mar 25;9:88. doi: 10.1186/1471-2458-9-88.
5. Brownlee M, Cerami A, Vlassara H. Advanced glycosylation end products in tissue and the biochemical basis of diabetic complications. *N Engl J Med.* 1988;318(20):1315.
6. Huang SW, Wang WT, Chou LC, Liou TH, Chen YW, Lin HW. Diabetes mellitus increases the risk of rotator cuff tear repair surgery: A population-based cohort study. *J Diabetes Complications.* 2016;30(8):1473.
7. Jiang J, Zhao C, Han T, Shan H, Cui G, Li S, Xie Z, Wang J. Advanced Glycation End Products, Bone Health, and Diabetes Mellitus. *Exp Clin Endocrinol Diabetes.* 2022 Oct;130(10):671-677.
8. Suzuki A, Yabu A, Nakamura H. Advanced glycation end products in musculoskeletal system and disorders. *Methods.* 2022 Jul;203:179-186.