



Human being and Sweeteners: The History of Honey and Sugar

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Abstract

Recently, health and medical problems related to carbohydrates, sugar, and sweets have been under discussion. Historically, wall paintings in the Altamira Cave in Spain depict people harvesting honey, suggesting honey as the earliest natural sweetener. White sugar originated from India before the Common Era by boiling down sugarcane juice. Since the Industrial Revolution, people have been able to obtain enough sugar at low cost. The widespread use of sugar has had a profound impact on food culture, tastes, and society around the world. Current issues regarding carbohydrates in modern society include the development of alternative sweeteners such as aspartame, sucralose, stevia, and erythritol.

Keywords

Altamira Cave, "Sweet Salt" (Śarkarā), Paleolithic Period, Industrial Revolution, Low Carbohydrate Diet

Abbreviations

LCD: Low Carbohydrate Diet

Commentary

Diabetes has been a serious health and medical issue worldwide. Various oral hypoglycemic agents (OHAs) have been developed [1]. Among these, sodium-glucose cotransporter 2 inhibitor (SGLT2-i) has been clinically applied and demonstrated several unexpected benefits [2]. In other words, by excreting sugar from the body through the urinary tract, it has shown impressive effects on diabetes, hypertension, heart failure (HF), and chronic kidney disease (CKD) [3]. This has shed light on the risks of excessive carbohydrate intake. From this perspective, the topic of the relationships among human beings, carbohydrates, sweeteners, and honey will be discussed from historical perspectives.

The historical relationship between human beings and sweetness dates back to the Paleolithic period [4]. Wall paintings in the Altamira Cave in Spain have been known [5]. At the foothills of the Iberian mountain in northeastern Spain, archaeologists have discovered a 7,500-year-old cave painting depicting prehistoric humans gathering honey. It shows a situation of climbing a rope ladder to reach a colony of bees [6] (**Fig-1**). In ancient Egypt, honey was considered sacred and was used to embalm mummies and for medicinal purposes [7]. Honey was also an important food ingredient in ancient Greece and Rome and was referred to as the food of the gods. Honey's carbohydrate composition is fructose (approximately

40%), glucose (approximately 35%), and sucrose (a few percent). Fructose barely raises blood sugar levels, but it is easily converted into triglycerides, making it a sweet taste that can be fattening. Honey contains vitamins, minerals, and more than 18 organic acids, and it has a nearly neutral pH value of 3.7. Nectar (flower honey) collected by bees is primarily sucrose. The invertase enzyme secreted by worker bees' salivary glands converts sucrose into glucose and fructose, concentrating the water content to 20%.

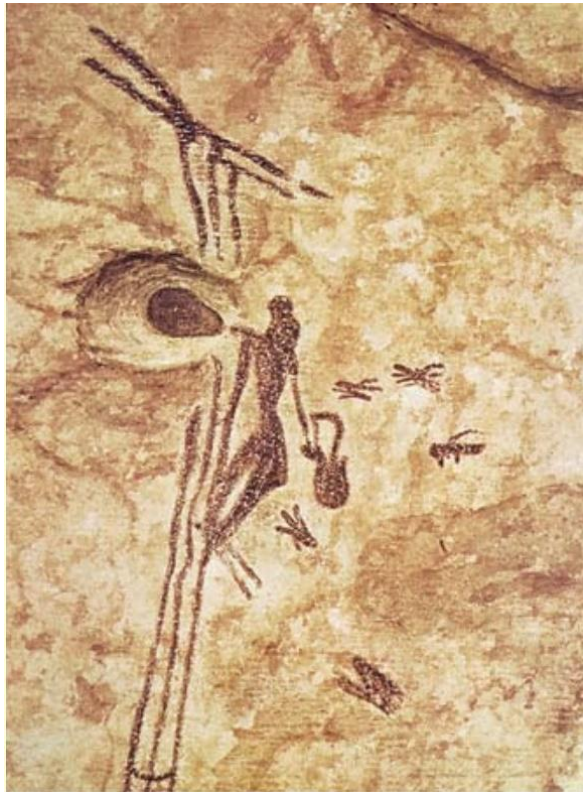


Fig-1:

Cave painting about 7,500 years ago in Spain showing prehistoric humans harvesting honey.

Another sweetener besides honey is white sugar. It was produced by Indians before the Common Era, who boiled down sugarcane juice to produce refined crystals. It was known as “sweet salt” (śarkarā) [8]. Indian sugar was introduced to the West during Alexander’s Eastern Expedition. At that time, it was out of reach for common people and highly prized. For a long time, honey was the only everyday sweetener in the West. The Chinese monk Xuanzang’s visit to India sparked the introduction of sugar-making techniques, and sugar production began after the 7th century. Sugar was introduced to Japan by the monk Ganjin from the Tang Dynasty in the late 8th century.

The Age of Discovery began between the 15th and 17th centuries. Improvements in compasses and astronomical instruments allowed the construction of larger ships capable of long voyages. European countries opened up new trade routes, which had a profound impact on society, the economy, and culture. Sugar became an important global trading commodity [9]. As a valuable commodity, sugar was previously only available to the aristocracy. The Industrial Revolution made it possible to produce it in large quantities and at low cost. Consequently, it became available to ordinary people, and tea with plenty of sugar became a common beverage in England. Today, excessive sugar intake is a serious problem worldwide, contributing to obesity and diabetes.

The main component of sugar is sucrose. It is produced from sugarcane and sugar beet [10]. Sucrose is a combination of glucose and fructose. Granulated sugar (99.95%) and rock sugar (99.98%) are examples of highly pure sucrose. White sugar, used in every household, is made by sprinkling a small amount of concentrated invert sugar liquid on sucrose crystals to give it a unique moist texture. It has a purity of 97.8%. “Invert sugar” is a mixture of glucose and fructose created by the decomposition (hydrolysis) of sucrose and is characterized by a sweeter taste than sucrose [11]. Sucrose is also found in small amounts in vegetables such as soybeans, radishes, Chinese cabbage, green onions, and spinach, as well as nuts such as almonds and peanuts. As mentioned above, sucrose has been commonly found in plants in nature.

The widespread use of sugar has had a profound impact on food culture, tastes, and society around the world [12]. In Europe, sugar was often associated with tea and coffee, fostering the chocolate and Western-style confectionery industries. In Japan, the introduction of sugar promoted the development of Japanese sweets. It also combined with the tea ceremony, forming a unique sweet culture. Thus, sugar has become more than just a source of nutrition; it has been deeply intertwined with cultural elements such as taste, art, society, economy, and ritual. However, since the modern era, mass consumption of sugar has led to various health and medical problems. The use of large amounts of sugar in soft drinks and processed foods has led to the rise of obesity and diabetes, becoming globally

critical issues. While sugar brings a sense of happiness, it has also been noted to be addictive. It necessitates society-wide efforts to curb its intake and education. We must treat sugar addiction or dependence in the same way as alcohol, tobacco, and drugs.

The issue of carbohydrates in modern society has been multifaceted. One is the development of alternative sweeteners such as aspartame, sucralose, stevia, and erythritol [13]. These are low in calories and have little effect on blood glucose levels, but research into their safety and long-term effects is still ongoing. The relationship between carbohydrate intake and the intestinal microbiota has also been attracting attention [14]. Several discussions have been observed about the possibility that excessive carbohydrates disrupt the intestinal environment and are related to inflammatory diseases and mental disorders. Furthermore, the sugar industry is also linked to environmental impacts and labor issues. They raise broader problems for promoting fair trade and sustainable agriculture. On the other hand, a low-carbohydrate diet (LCD) may show several beneficial points for maintaining optimal daily health [15]. In the future, carbohydrates will need to be redefined not simply as nutrients but as complex elements connecting health, society, and the environment.

In summary, contemporary issues and future prospects concerning carbohydrates and related matters have been described in this article. Carbohydrates are essential nutrients for humankind, but they pose medical risks and social challenges. In modern society, they are directly linked to health issues, food culture, and environmental problems. Consequently, proper understanding and utilization of carbohydrates may hold the key to sustainable lifestyles in future societies.

Conflict of Interest

The authors have read and approved the final version of the manuscript. The authors have no conflicts of interest to declare.

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References

- [1] American Diabetes Association Professional Practice Committee. 9. Pharmacologic Approaches to Glycemic Treatment: Standards of Care in Diabetes-2025. *Diabetes Care*. 2025 Jan 1;48(1 Suppl 1):S181-206. [PMID: 39651989]
- [2] Bando H, Wood M, Ebe K. Expanding Applications of Sodium-Glucose Cotransporter-2 Inhibitors (SGLT-2i) with Attention to Euglycemic Ketoacidosis (Eka) for No Diabetic History. *Diab Res Open Access*. 2025 Apr 23;6(1):06-10.
- [3] Hong S, Han K, Kim KS, Park CY. Effects of RAS and SGLT2 inhibitors alone or in combination on end-stage kidney disease and/or all-cause death in patients with both diabetes and hypertension: a nationwide cohort study. *Cardiovasc Diabetol*. 2025 Jul 14;24(1):288. [PMID: 40660221]
- [4] Singh A, Singh D. The Paleolithic Diet. *Cureus*. 2023 Jan 25;15(1):e34214. [PMID: 36843707]
- [5] UNESCO World Heritage Centre. Cave of Altamira and Paleolithic Cave Art of Northern Spain [Internet]. Paris: UNESCO. Available from: <https://whc.unesco.org/en/list/310>
- [6] Saed O. Found: A 7,500-Year-Old Cave Painting of Humans Gathering Honey [Internet]. *Gastro Obscura (Atlas Obscura)*; 2021 Dec 16. Available from: <https://www.atlasobscura.com/articles/honey-cave-painting>
- [7] Bowie A. The ritual role of honey in ancient Egypt, Hatti and Greece. *Central and Eastern European Online Library*. 2020;31:7-23.
- [8] McHugh J. Śīdhu (Śīdhu): The sugar cane “wine” of ancient and early medieval India. *History of Science in South Asia*. 2020;8:36-56.
- [9] Goodall M. Sugar in the British Atlantic world 1650-20 [PhD thesis]. Oxford: University of Oxford; 2022. Available from: <https://ora.ox.ac.uk/objects/uuid:3f9fa73b-7fdf-4e68-b92a-02938b328dc3/files/dgm8ohv721>
- [10] Tayyab M, Wakeel A, Mubarak MU, Artyszak A, Ali S, Hakki EE, Mahmood K, Song B, Ishfaq M. Sugar Beet Cultivation in the Tropics and Subtropics: Challenges and Opportunities. *Agronomy*. 2023;13(5):1213.
- [11] Bugarova V, Godocikova J, Bucekova M, Brodschneider R, Majtan J. Effects of the Carbohydrate Sources Nectar, Sucrose and Invert Sugar on Antibacterial Activity of Honey and Bee-Processed

Syrups. Antibiotics (Basel). 2021 Aug 15;10(8):985.

[PMID: 34439035]

[12] Matthew M. Commodity modernism: tobacco and sugar in twentieth-century global literatures [PhD thesis]. Norwich: University of East Anglia; 2024. Available from:

<https://ueaeprints.uea.ac.uk/id/eprint/99469/>

[13] Dragomir N, Grigore DM, Pogurschi EN. Beyond Sugar: A Holistic Review of Sweeteners and Their Role in Modern Nutrition. Foods. 2025 Sep 12;14(18):3182.

[PMID: 41008155].

[14] Mora-Flores LP, Moreno-Terrazas Casildo R, Fuentes-Cabrera J, Pérez-Vicente HA, de Anda-Jáuregui G, Neri-Torres EE. The Role of Carbohydrate Intake on the Gut Microbiome: A Weight of Evidence Systematic Review. Microorganisms. 2023 Jun 30;11(7):1728.

[PMID: 37512899]

[15] Wood M, Bando H, Ebe K. Immune function augmentation in low-carbohydrate diet (LCD). *Int J Endocrinol Diabetes*. 2025;8(1):186.