



Is Honey the Same as Sugar?



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Both honey and sugar are carbohydrate, calorie-dense sweeteners. This article reviews similarities and differences of honey and sugar, then, answers the popular questions: "Is honey better than sugar?" and "What are cooking tips when substituting honey for sugar in recipes?"

Composition and Nutrition value in Honey and Sugar

Honey and sugar are both made up of a combination of glucose and fructose. In sugar, glucose and fructose are bound together to form sucrose, which comes from sugar beets or sugar cane and is more commonly known as table sugar. In honey, fructose and glucose are primarily independent of each other. Additionally, about 25 different oligosaccharides have been detected in the composition of honey.

One tablespoon of white, granulated sugar contains 49 calories, while one tablespoon of honey has 68 calories, which is the cause of honey having a higher density and weight than sugar. Dietary Guidelines for Americans (2010) and American Heart Association (2009) recommends "Reduce intake of added sugars", without singling out any particular types, such as sugar or honey.

Digestion of Honey and Sugar

The difference between the digestion of honey compared to the digestion of sugar lies in the composition of enzymes in each of these products.

Sucrose (table sugar) passes through the stomach without any digestion happening because of its disaccharide (a sugar composed of two monosaccharides) composition. This means

that the enzymes in the stomach cannot break down the glucose-fructose structure of table sugar until it reaches the small intestine. Then the liver utilizes a few enzymes to convert the molecules into glucose that is able to enter the bloodstream for further use.

Honey is different because of the enzymes that are added to the nectar by bees that divide the sucrose into two simple sugars, fructose and glucose. These sugars are directly absorbed by our bodies and are easier to digest.

Glycemic Index of Sugar and Honey

The glycemic index (GI) is a measure of how carbohydrates deal with glucose in the blood. A carbohydrate with a low GI allows for only a small increase in blood glucose, while a carbohydrate with a high GI leads to a high blood glucose level. The average glycemic index for honey is 55 ± 5 and this can be compared to the glycemic index of sugar, which is 68 ± 5 . Honey is a lower GI than sugar. Research has shown that foods with a low GI, a small increase in blood glucose, may provide reduced risk of coronary heart disease and type 2 diabetes.

Health Concerns for Infants

Honey is not recommended for infants under one year of age. Infants are susceptible to the disease "infant botulism" which is caused by spores of the bacterium *Clostridium botulinum* that is present in natural foods. It is difficult to remove bacterium spores from honey. These spores are consumed without harm by children and adults. However, children under the age of 12 months do not have mature enough gastrointestinal tracts to combat the toxins that could come from this bacterium.

Table 1.

Item Name	Quantity	Measure	Weight (g)	Calories (Kcal)
Honey, amber	1	Tablespoon	21	68
Sugar, white, granulated	1	Tablespoon	13	49
Honey, amber	1	Ounce-weight	28	92
Honey, clover	1	Ounce-weight	28	86
Honey, dark	1	Ounce-weight	28	86
Honey, white, org	1	Ounce-weight	28	92
Sugar, brown	1	Ounce-weight	28	108
Sugar, white granulated	1	Ounce-weight	28	110

(Reference: The Food Processor® SQL Nutrition Analysis and Fitness Software, ESHA Research, Salem OR)

Recipe

Honey Mustard Chicken

212 kcal, 12g Carbohydrate, 25g Protein, 6g Fat per serving

Ingredients: 2 servings

About ½ lb – Chicken breasts, boneless, skinless

Batter:

2 teaspoon – Cornstarch

1 Egg white

Honey Mustard Sauce:

1 Tablespoon Honey

1 Tablespoon Mustard

¼ teaspoon – Soy sauce

Directions:

1. Cut the chicken into bite sizes and sprinkled with salt and pepper, and set aside.
2. Beat the egg white in a separate bowl, add cornstarch, and mix well.
3. Add the chicken to the beaten batter mix, tossing to coat.
4. Heat olive oil in the frying pan over low to medium heat. Add the chicken to the pan.
5. Cook each side of the chicken until golden brown and fully cooked (no more pink showing around the edge). Use a cooking thermometer to ensure that the chicken is fully cooked to 165°F.
6. Mix all the ingredients of honey mustard sauce in a small bowl.
7. Toss with the honey mustard sauce to coat the cooked chicken and serve!



Cooking Tip:
The key to success with this recipe is even heat. If the oil gets too hot, the chicken may brown too quickly before fully cooked.

Symptoms of infant botulism include: constipation, a weak cry, and general muscular weakness. Children exhibiting these symptoms should receive medical attention promptly. (NATIONAL HONEY BOARD, Fact Sheet)

Cooking tips when substituting honey for sugar in recipes

- Use 1 part honey for every 1 ¼ parts sugar.
- Add ½ teaspoon baking soda for every cup of honey to reduce the acidity and weight of honey. (The average pH of honey is 3.9, which is acidic.)
- Honey has a tendency to increase the browning of baked products. Adding ⅛ of a teaspoon of baking soda allows even browning; reducing oven temperatures by 25 degrees helps prevent overbrowning.
- Coating the inside of a measuring cup with water or very thin layer of vegetable oil before measuring honey can minimize the stickiness.

Glossary Terms

Antioxidant: An antioxidant is a chemical that prevents the oxidation of other chemicals. In biological systems, the normal processes of oxidation produce highly reactive free radicals. These can readily react with and damage other molecules, but the presence of easily oxidisable compounds (antioxidants) in the system can “mop up” free radicals before they damage other essential molecules. Antioxidants can be found in vegetables, fruits and plants.

Enzyme: Enzyme is a compound that speeds the rate of a chemical process in a body. Almost all enzymes are proteins.

Flavonoids: Flavonoids are pigments that are found in many plants. The USDA defines flavonoids as a large group of non-nutrient chemicals in plants called phytochemicals, which have biological activities related to health. A few examples are beta-carotene (found in green leafy and orange vegetables), isoflavones (found in soy foods), anthocyanins (found in berries and other red, pink, blue, and purple fruits and vegetables), and quercetin (found in red wine, tea, green vegetables, and citrus fruit).

Fructose: A simple sugar (monosaccharide) found in honey, many fruits, and some vegetables. Fructose linked to glucose is the structure of table sugar, or sucrose.

Gastrointestinal tract: The gastrointestinal tract starts with the mouth and proceeds to the esophagus, stomach, duodenum, small intestine, large intestine (colon), rectum and, finally, the anus.

Glucose: When you eat, your body turns the food into a sugar called glucose. Glucose provides fuel for your cells. How does it get to the cells? It is carried to them by the bloodstream. The hormone, insulin helps the glucose get to the cells, so it can be used for energy.

Glycemic Index: The body breaks down most carbohydrates from the foods we eat and changes them to a type of sugar called glucose. The glucose travels through the bloodstream to reach the cells. After we eat, the glucose from the food gets into the bloodstream fast, slow, or somewhere in between. It

Quick Facts:

- At present the annual world honey production is about 1.2 million tons, which is less than 1% of the total sugar production.
- In the US, Canada, and Australia, the average per capita of honey consumption is 1.3 to 1.8 pounds/year.
- A typical beehive can make up to 400 pounds of honey each year.
- Honey comes in many forms like crystallized, dried, filtered and raw.
- Honey is primarily 82% carbohydrates with 38.2% being from fructose and 31% being from glucose and is also composed of 17% water.
- Sucrose is composed equally of 50% fructose and 50% glucose.
- Honey contains trace amounts of many B-Vitamins like riboflavin, niacin, folic acid, pantothenic acid, vitamin B6, and vitamin C. It also contains antioxidants called flavonoids, which may have an anti-inflammatory effect on the body. Sugar does not “cool” plug for honey.
- Health promoting properties of honey are only achieved by application of rather high doses of honey such as 2-4 tablespoons per intake. (Bogdanov et al, 2008)

depends on the type of carbohydrate and the food that contains it. The glycemic index or GI is a way of measuring how fast this occurs and how a food affects blood glucose levels following consumption of the food. Foods with higher index values raise blood sugar more rapidly than foods with lower glycemic index values do. Glucose has a Glycemic index of 100.

Nectar: Nectar is a sugar-rich liquid produced by flowers of various plants, and gathered by bees for making honey.

Oligosaccharide: Carbohydrates that contain a few monosaccharide units linked together.

Sucrose: Sucrose is a disaccharide, which means that it is made of two molecules, one glucose and one fructose, bonded together. A common variety of sugar found in the juices of many plants, as the sugar cane, sorghum, sugar maple, beet root, etc.

References

Bogdanov, S., Jurendic, T., Sieber, R., Gallmann, P. Honey for nutrition and health: A review. *J. Am. Coll. Nutr.* 2008, 27, 677-689.

National Honey Board. <http://www.honey.com/nhb/about-honey/>

Dietary Guidelines for Americans, 2010 (US Department of Agriculture, US Department of Health and Human Services) <http://www.cnpp.usda.gov/Publications/DietaryGuidelines/2010/PolicyDoc/>