



# 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, and 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.<sup>1</sup>

One tablespoon of white, granulated sugar contains 48 calories while one tablespoon of honey has 68 calories, which is the cause of honey having a higher density and weight than sugar. (See Table1)

The 2015 Dietary Guidelines for Americans<sup>2</sup> and American Heart Association<sup>3</sup> recommend limiting calories from added sugars, without singling out any particular types such as sugar or honey.

As shown in Table 2, the prices of different types of honey vary. The prices were checked in several grocery stores (such as Safeway) and mega-supercenter (such as Wal-Mart) near the University of Arizona, Tucson, Arizona.

## Digestion of Honey and Sugar

The difference between the digestion process for honey and 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.

Table 1. Calories in sugar and different types of honey

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	108

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

Table 2. Price of sugar and honey in local stores

Item Name	Net Weight	Total Price	Average Price per oz
Honey, dark	11~16 oz	\$3.98 ~ \$4.89	~33 cents
Honey, clover	16~24 oz	\$3.89 ~ \$6.99	~33 cents
Honey, organic	16~24 oz	\$4.98 ~ \$9.99	~35 cents
Honey, mesquite	16~24 oz	\$4.98 ~ \$11.99	~40 cents
Sugar, white granulated	64 oz	\$2.99 ~ \$3.49	~ 5 cents
Sugar, light brown	32 oz	\$1.98 ~ \$2.99	~ 8 cents

## Glycemic Index of Sugar and Honey

The **glycemic index** (GI) is a value assigned to foods based on how fast or slow your body changes carbohydrates into glucose in the blood. A carbohydrate with a low GI allows for only a small increase in blood glucose levels, while a carbohydrate with a high GI leads to a high blood glucose level. The GI for honey is 55-58 and this can be compared to the GI of sugar, which is 63-65. Honey has a lower GI than sugar. Research has shown that foods with a low GI, a small increase in blood glucose and may provide reduced risk of coronary heart disease<sup>3</sup> and type 2 diabetes.<sup>4</sup>

## 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. Symptoms of *infant botulism* include: constipation, a weak cry, and general muscular weakness. Children exhibiting these symptoms should receive medical attention promptly.<sup>5</sup>

## 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 ⅓ 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.

# 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.

## Honey Vinegar Carrot Salad

200 kcal, 26g Carbohydrate, 3g Protein, 10g Fat per serving

### Ingredients: 2 servings

2 cups, fresh carrots (washed, scrubbed or peeled, and shredded)

¼ cup, walnuts (chopped)

3 tablespoons, raisins

1 tablespoon, honey

2 tablespoons, vinegar

1 teaspoon, any types of oil (e.g., olive oil, sesame oil, etc.)

#### Directions:

1. Wash hands with soap and running water, rinse, and then dry hands with a clean towel.
2. Mix all ingredients in a large mixing bowl, and serve. (Or cover with plastic wrap and refrigerate for an hour. Toss again and serve.)



## 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, the average per capita of honey consumption is 1.3 pounds per year.
- A typical beehive can make up to 400 pounds of honey each year.
- Honey comes in a variety of colors and flavors depending on the region and floral source.
- Flavors of honey produced in the US include alfalfa, buckwheat, carrot, clover, mint, orange, wild berry, and wildflower.
- Honey is produced in every state. In 2015, North Dakota was the single largest producer of honey in the US. (National Agricultural Statistics Service, Agricultural Statistics Board, U.S. Department of Agriculture, March 2016)
- Honey comes in many forms including crystallized, dried, filtered, and raw.
- Honey is primarily 82% carbohydrates with 38.2% being from fructose and 31% being from glucose.
- Sucrose is composed equally of 50% fructose and 50% glucose.
- Honey contains trace amounts of Vitamin C as well as many B-Vitamins like riboflavin, niacin, folic acid, pantothenic acid, vitamin B6. It also contains **antioxidants** called **flavonoids**, which may have an anti-inflammatory effect on the body.
- Health promoting properties of honey are only achieved by application of rather high doses of honey such as 2-4 tablespoons per intake.<sup>1</sup>
- Shelf life and storage conditions: granulated sugar - 2 years; brown sugar - 4 months; honey 12 months. Put in an airtight container and cover tightly. Store them in a cool, dry location. Store sugars in an odor free area. Sugar can absorb strong odors.<sup>6,7</sup>

## Glossary Terms

**Antioxidant:** Antioxidants are substances found in foods which inhibit (=anti) oxidation in the body's cells – oxidation is a chemical reaction that produces free radicals. Free radicals cause destruction of our body's cells and antioxidants stop them. Recent studies have shown antioxidants reduce the risk of heart disease and cancer. Antioxidants can be found in vegetables, fruits, and plants.

**Enzyme:** Enzyme is a compound that speeds the rate of a chemical process in the 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 carbohydrates (or sugar composed of two glucose molecules). Glucose provides fuel for your body's cells. How does it get to the cells? It is carried to them through the bloodstream. The hormone insulin helps the glucose get to the cells, so it can be used by the body 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 depends on the type of carbohydrate and the food that contains it. The glycemic index (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 GI values do. Pure glucose has a GI of 100.

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

**Oligosaccharide:** : A carbohydrate that contains a few monosaccharide or disaccharide units linked together.

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

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## Abstract

This article reviews similarities and differences of honey and sugar. It answers the popular questions, “Is honey better than sugar?” and “What are cooking tips when substituting honey for sugar in recipes?” The article provides healthy honey recipes with cooking tips.



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