

Important concepts related to carbohydrates

Carbohydrates have a strong influence on blood sugar. This is because carbohydrates are digested to form sugars. When these sugars are absorbed through the small intestine and passed into the blood, they cause the level of blood sugar to rise. This also triggers the release of insulin from the pancreas. Insulin will cause the muscles of the body to absorb the blood sugar and normalize blood sugar levels. Therefore, it is important to understand the following concepts about carbohydrates and blood sugar levels.

Glycaemic index (GI): This is the measure of how quickly a carbohydrate is broken down into sugars and will lead to a rise in blood sugar.

- Simple sugars do not need to be broken down, they are absorbed very quickly from the digestive system and will lead to a rapid increase in blood sugar. Therefore, sugars and sugary drinks like juices have high glycaemic index.
- Processed carbohydrates like flour, pasta, fufu etc that have undergone some level of breakdown before they are eaten will release sugars very quickly and will also cause a rapid rise in blood sugar. Therefore, foods like bread, biscuits, fufu, pap have high glycaemic index.
- Unprocessed carbohydrates like fruits, tubers and suckers that have low fiber content are also rapidly broken down to sugars during digestion and also have high glycaemic index.
- Unprocessed carbohydrates like whole grains that have very high fiber content are slowly digested. Hence, they will release sugars very slowly and do not cause rapid rise in blood sugar. They have lower glycaemic index.
- Vegetables have very low carbohydrate content and high fiber content. Hence, they do not tend to cause rapid rise in blood sugars. They have low glycaemic index.

Glycaemic index offers a guide on selection of food choices. It is better to avoid eating foods with a high glycaemic index in large amounts. However, glycaemic index does not provide a true picture of how much the blood sugar will rise. This depends on the quantity of the carbohydrates eaten as well as other accompanying foods in the meal. For example, combining carbohydrates with proteins and vegetables tend to slow down the digestion process and the sugars are not rapidly released into the blood stream. Food preparation also has an influence on how quickly the carbohydrate will be digested to release sugars into the blood stream.

This is better explained by another concept called glycaemic load.

Glycaemic load (GL): This measures the extent that the carbohydrate will cause a rise in blood sugar by considering both the glycaemic index to the amount of the carbohydrate in the food consumed. For example, eating a very tiny portion of a carbohydrate with a high GI may not have a significant rise in blood sugar compared to eating a large portion of a carbohydrate with low GI.

Glycaemic load is calculated as; $GL = GI \times (\text{amount of carbohydrate in the food expressed in grams divided by } 100)$

Carbohydrate counting: It is important to keep record of the amount of carbohydrate eaten during each meal. This process is called carbohydrate counting. This is useful for adjusting the dose of insulin and other glucose lowering drugs that induce the secretion of insulin, achieving weight loss goals and gaining a better understanding of how to limit carbohydrate intake when eating a low carbohydrate or very low carbohydrate diets.

Tips to achieve carbohydrate counting includes:

- Weighing food
- Using measuring cups
- Reading food labels
- Keep a food diary
- Using food guides

It is important to track the amount of carbohydrate in every meal and every snack.

As a general rule, 15grams of carbohydrate is equal to one carbohydrate count

Calculating net carbs: Net carbohydrate refers to the amount of carbohydrate that is absorbed into the blood stream after digestion. This is an important concept because not all carbohydrates are absorbed through the gut. Fibers are not absorbed while sugar alcohols are partially absorbed.

Net carbohydrate is calculated by subtracting fiber and half of the amount of sugar alcohols from foods.

Whole foods like millet, oats, brown rice, yam may not have the content of sugar alcohols clearly stated. Therefore, subtract only the amount of fiber.

Example, according to the [US Department of Agriculture Food Database](#), one cup of cooked whole millet weighs about 174 grams and contains 41 grams of carbohydrate and 2.26 grams of fiber. The net carbohydrate content in this cup of millet will be calculated by subtracting 2.26 grams from 41 grams.

Net carbs in a cup of cooked millet = $41 - 2.26 = 38.74$ grams

Now if this same millet was processed and contained sugar alcohols like maltitol say 9 gram

Then the net carbs in this cup of millet = $41 - 2.26 - (9 * 0.5)$ that is $41 - 2.26 - 4.5 = 34.24$ grams

Calculating carbohydrates by food weight using the food factor: The food factor is the amount of carbohydrate in a given amount of food.

Your Food Weight X Food FACTOR= Grams of Carbohydrate in that Food

Let us use the cooked millet above to define the food factor.

174 grams of cooked millet has 41 grams of carbohydrate. This means that the food factor is 41 divided by 174. This means that the food factor is 0.24. This means that there are 0.24 grams of carbohydrate in each gram of cooked millet.