

EFFECTS OF CARBOHYDRATE CONSUMPTION. CASE STUDY: CARBOHYDRATES IN BREAD

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Abstract: *Carbohydrates perform numerous roles in living organisms; they are an important source of energy. The body uses carbohydrates to make glucose which is the fuel that gives it energy and helps keep everything going. However, excess carbohydrate consumption has negative health effects. Bread is a basic product in our nutrition and it also is a product with a high content of carbohydrates. So, it is important to find out more information on bread and on the recommended bread type best for consumption.*

Key words: *bread, carbohydrate, food, glycemic index.*

1. Introduction

The carbohydrates are divided into four chemical groupings [3]: monosaccharide's, oligosaccharides and polysaccharides. In general, the monosaccharide's which are smaller (lower molecular weight) carbohydrates are commonly referred to as sugars. The word saccharide comes from the Greek word *sákkharon*, meaning 'sugar'. While the scientific nomenclature of carbohydrates is complex the names of the monosaccharide's and disaccharides very often end in the suffix 'ose'. For example, grape sugar is the monosaccharide glucose, cane sugar is the disaccharide sucrose, and milk sugar is the disaccharide lactose.

Carbohydrates perform numerous roles in living organisms. Polysaccharides serve for the storage of energy and as structural components. In food science and in many

informal contexts, the term carbohydrate often means any food that is particularly rich in the complex carbohydrate starch (such as cereals, bread, and pasta) or simple carbohydrates, such as sugar (found in candy, jams, and desserts).

The body uses carbohydrates to make glucose which is the fuel that gives it energy and helps keep everything going. The body can use glucose immediately or store it in its liver and muscles for when it is needed. Healthier foods higher in carbohydrates include ones that provide dietary fiber and whole grains as well as those without added sugars. Foods higher in carbohydrates such as sodas and candies contain added sugars. Those are the ones that add extra calories but not many nutrients to your diet.

Each type of carbohydrate has important health benefits; so one should eat a variety of these foods to get enough of both. It is

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also more likely to get other nutrients that you might miss if you just chose 1 or 2 high-fiber foods. Most people greatly under-consume dietary fiber. Breads, rolls, buns and pizza crust made with refined flour are not among the best sources of dietary fiber, but currently contribute to a large portion our diets. To meet the recommendations for fiber, most people need to increase the consumption of beans peas other vegetable, fruits and whole grains, and other foods with naturally occurring fiber.

Whole grains are a good source of fiber and nutrients [5]. Whole grains refer to grains that have all of the parts of the grain seed (sometimes called the kernel). These parts of the kernel are called the bran, the germ, and the endosperm.

If the whole grain has been cracked, crushed, or flaked (as in cracked whole grain bread or flake cereal), then the whole grain must still have about the same proportions of bran, germ, and endosperm to be called a whole grain.

When whole grains are processed, some of the dietary fiber and other important nutrients are removed. A processed grain is called a "refined" grain.

Some refined grain products have key nutrients, such as folic acid and iron, which were removed during the initial processing and added back. These are called enriched grains. White rice and white bread are enriched grain products. Some enriched grain foods have extra nutrients added. These are called fortified grains.

2. Types of carbohydrates

A good classification of carbohydrates is made by their glycemic index (GI), which is an indicator of the rate of release (digestion) sugar from food and the rate of its absorption into the blood the rate of its absorption into the blood. Thus, if a food

releases glucose slowly, it will be absorbed slowly into the bloodstream and will not lead to high levels of glucose and consequently insulin secretion will not be very high.

The glycemic index (GI) is measured by determining the concentration of glucose in the blood, three hours after ingestion of food containing 50 grams carbohydrates absorbed [1].

This index is less influenced by protein or fat content of the food.

After glycemic index foods are divided into three categories:

1. Foods with high glycemic index (≥ 70), that cause the rapid increase and high of sugar in blood ("bad food");
2. Food with low glycemic index (≤ 50), that do not lead to large increases the glucose levels in blood ("good food");
3. Food with medium glycemic index, that fall between the two categories that fall between the two categories.

There are two main types of carbohydrates:

- 1 Complex carbohydrates
- 2 Simple carbohydrates

Complex Carbohydrates

Complex carbohydrates are that take the body longer to break down. These carbohydrates typically are high in fiber, which takes the body longer to break down and helps stabilize blood sugar levels. The best sources of good carbohydrates include fresh vegetables, fresh fruit, whole grains and beans. All of these foods provide the body with energy, vitamins, fiber, minerals and phyto-nutrients. In addition to fresh fruit and vegetables, examples of good carbohydrates include whole grain cereals, whole wheat breads, brown rice, wheat berries, whole wheat pasta and black beans.

If you have been following a low-carbohydrate long term diet, then you run the risk of having your body enter ketosis.

Ketosis is a medical condition that occurs when fats are not completely broken down. This can occur on a low-carbohydrate diet because it is much more difficult for the body to break down fats or protein for energy sources as compared to carbohydrates. Side effects of ketosis include nausea, weakness, dizziness and dehydration.

Simple Carbohydrates

Simple carbohydrates include sugars found naturally in foods such as fruits, vegetables milk, and milk products. Simple carbohydrates also include sugars added during food processing and refining. In general, foods with added sugars have fewer nutrients than foods with naturally-occurring sugars. Simple carbohydrates (sugar) cause tooth decay.

Glucose is transported around the body via blood and taken into cells to be converted into energy. The pancreas gland in your abdomen secretes the hormone insulin, which controls the uptake of glucose by your cells. If you have any excess glucose, this is converted into glycogen – which is stored in the liver or in the fat around the body. When your body needs more energy, a second hormone called glucagon is secreted by the pancreas. This converts the glycogen back into glucose, which is then released into your bloodstream for your cells to use. This means the body's glucose (sugar) metabolism is a cycle of glucose, insulin and glucagon reactions.

- The slower the release of glucose and hormones, the more stable and sustainable the energy levels of the body.
- The more refined the carbohydrate, the faster the glucose is released into your blood. This can cause peaks and drops in your blood sugar level and less stable energy levels in the body.

Complex carbohydrates provide a slower and more sustained release of energy than

simple carbohydrates. In their natural form they contribute to long-term good health, appetite control and sustained energy levels.

3. Health benefits and side effects of carbohydrates

The scientists are still debating about carbohydrates, although this is what they know for sure until now.

Carbohydrates are a necessary part of a balanced diet. They are completely safe and are generally free of side effects. However, overconsumption of simple carbohydrates (sugars) can result in obesity and other associated diseases [9].

Carbohydrates are needed for life. The central nervous system is only able to use glucose (a simple carbohydrate) for energy. In regards to bodybuilding and exercise performance, carbohydrates provide both rapid and sustained fuel during training. Inadequate carbohydrates may be seriously detrimental to performance.

Simple carbohydrates such as glucose (dextrose) are rapidly absorbed and have been shown to be beneficial for both extending endurance, as well as increasing the rate of recovery by replacing used up muscle glycogen [8]. More complex carbohydrates such as waxy maize starch are more slowly broken down and release a steady supply of energy. It has been shown that such carbohydrates are able to better sustain athletes towards the end of a long bout of exercise.

4. Types of bread

Because the pull of the market economy has manifested, among others, through a boom of wares assortment, the consumer has difficulties in choosing those wares which have the adequate quality to satisfy his body's needs. [4]

The most popular and consumed types of bread are: white bread, whole wheat bread and graham bread.

White bread is made from refined white flour containing several unwholesome constituents and are poor in nutrients and dietary fibers, essential for a healthy digestive system and a stable metabolism.

Refined white flour is produced from the whole wheat grain which is then subjected to the refining process which removes all traces of the husk, or bran and along with it all the goodness contained in the grain. It is then bleached using chemical bleaching agents which contain chlorine and dried in kilns at high temperature to kill any remaining beneficial constituents.

This insipid, bland, tasteless powder then has gluten added, which is a product that an increasing number of people are becoming allergic to, which helps to produce a more evenly risen and air filled loaf. A standard white loaf of bread also has sugar added to enable the baker's yeast to prove the dough and make it rise. Salt is also added to check the progress of the yeast and prevent the loaf from rising too much, or over-proving.

The health benefits of whole wheat bread depend entirely on the form in which you eat it. These benefits will be few if you select wheat that has been processed into 60% extraction, bleached white flour. 60% extraction—the standard for most wheat products, including breads, noodles and pastas, baked goods like rolls or biscuits, and cookies—means that 40% of the original wheat grain was removed, and only 60% is left. Unfortunately, the 40% that gets removed includes the bran and the germ of the wheat grain—it's most nutrient-rich parts. In the process of making 60% extraction flour, over half of the vitamin B1, B2, B3, E, folic acid, calcium, phosphorus, zinc, copper, iron, and fiber are lost [7].

Whole grains are a rich source of magnesium, a mineral that acts as a co-factor for more than 300 enzymes, including enzymes involved in the body's use of glucose and insulin secretion.

Graham bread was invented by Sylvester Graham in 1829 for his vegetarian diet. The Graham bread was high in fiber, made with non-sifted whole-wheat flour.

Graham created bread free from the chemical additives that were common in white bread at that time such as alum and chlorine. He argued that these chemical additives were unwholesome in that they increased the sex drive, which would in turn deplete the body.

While Graham's specific theories on the dangers of "venereal excess" have no scientific footing, he was correct in his broader stance against additives as both alum and chlorine are now known to be toxic. The use of additives by bakeries was a common practice during the Industrial Revolution to make bread whiter in color and more commercially appealing. Refined bread was a status symbol of the middle class because of its "purity and refinement" in its color and was purchased, rather than home-made which is more usual at Middle Europe where bread is made from natural sources and is more wheat with grain consistency.

5. Case study: carbohydrates in bread

Eating mass produced white bread can be somewhat likened to eating cardboard, such is its blandness and lack of any useful dietary benefit whatsoever. Small bakery bread and homemade loaves usually taste a little better but because refined white flour is used in their production, there is still no health benefit.

White bread contains a large proportion of high GI (glycemic index) carbohydrates. These carbohydrates cause sugars to be released quickly into the bloodstream. This

causes a rapid rise in blood sugar levels which triggers a similarly rapid release of the body's own sugar regulating hormone, insulin. This hormone is secreted in the pancreas and is responsible for regulating blood sugar levels. Insulin is what people suffering with type 1 diabetes have to inject to regulate their blood sugar levels because their body does not produce sufficient naturally. Type II diabetes is a rapidly spreading disease brought on by too frequent imbalances in blood sugar levels causing insulin production to become overworked, which eventually leads to the problem and all the negative health aspects associated with it.

Another negative effect of eating white bread is on the body's metabolism. This is causing reduced efficiency in digestion and greater fat storage, which is more often than not accumulated around the belly.

In fact, this is one of the main reasons why weight loss is so difficult for people who continue to eat white bread. Not only that, but it makes you feel more sluggish and less inclined to want to exercise. The lack of dietary fiber is a big problem for your digestible tract especially the intestines that finish the job and allow waste to leave the body.

When there is little or no dietary fiber present in your diet, your colon will suffer and be unable to effectively remove all waste products from the body.

The many benefits of whole wheat products are being recognized more and more by consumers [6]. Even though many health-conscious individuals have been cutting back on their intake of total carbohydrates and refined wheat products, the demand for whole wheat products has actually increased during that same time period. This trend fits in well with a Mediterranean diet approach to health, which looks to lower overall carbohydrates but higher whole grains, including whole wheat.

6. Conclusions

Carbohydrates are important in our nutrition; they are an important source of energy. Carbohydrates are involved in food properties: stability, acceptability and food specificity [2].

Carbohydrates are important because they convert into glycogen as energy reserve of the body and contribute to synthesis of some fats necessary life.

Carbohydrates are a necessary part of a balanced diet. They are completely safe and are generally free of side effects. However, overconsumption of simple carbohydrates (sugars) can result in obesity and other associated diseases. Carbohydrates are a necessary part of a balanced diet. They are completely safe and are generally free of side effects.

Bread is a basic element in our diet but, what is important about it, is the quantity we consume and the flour type the respective bread is made of.

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