

Importance Of Soluble Fiber In Treating Diabetes

Current recommendations are to consume 25-30 grams of fiber each day by consuming a diet rich in plant foods. It has been suggested that diets rich in fiber may have health benefits for individuals who have diabetes by improving glycemic control.

Soluble fiber helps dieters in several ways. First, foods containing soluble fiber typically take more time to consume and are more enjoyable to chew. Second, the stomach empties more slowly, causing greater feelings of fullness and fewer cravings. Third, it “soaks up” some of the calories in a meal by trapping nutrients in its gel so that it is harder for them to be absorbed before leaving the body as eliminated waste.

Diabetes is a disease in which the body is unable to produce insulin (type 1), cannot produce enough insulin (type 2), or has become insulin resistant (type 2). Insulin is a hormone that lets cells know when they should absorb blood glucose (sugar) to burn for energy. Without the proper functioning of insulin, blood glucose increases to dangerously high levels. Fortunately, scientists have shown that soluble fibers such as konjac glucomannan may slow insulin response and the rise in blood glucose levels after a meal, as well as reduce blood cholesterol. In addition, soluble fiber may help diabetic patients lose weight and improve the health of their colons.

Dietary fiber is defined as the complex carbohydrates from plants that humans lack the enzymes to digest. Fiber is divided into two categories: soluble and insoluble. Whereas insoluble fiber passes through the digestive tract relatively unchanged, soluble fiber dissolves to form a soft gel. Although insoluble fiber is an important component of healthy diets, this article focuses on soluble fiber because of its special characteristics as related to diabetes. Pectins, gums, and mucilages are examples of soluble fiber. Some familiar foods that contain soluble fiber are apricots, citrus, oats, lentils, and dried beans and peas.

The most important qualities of soluble fiber are viscosity and fermentability. Viscosity refers to the thickness of a solution and its resistance to flow. Soluble fiber binds 20-200 times its weight in water, becoming a viscous, slow-moving solution. Fermentability refers to the digestion of soluble fiber by “friendly” bacteria inhabiting the intestines. These bacteria produce beneficial chemicals and fecal matter. Not all soluble fiber is fermentable. However, bacteria in the digestive tract depend on soluble fiber in order to flourish and ward off infections of “hostile” bacteria.

Blood Glucose & Insulin Sensitivity

Many diabetic patients keep track of the glycemic index of their foods. Foods with a high glycemic index, such as processed starches and the sugar in soft drinks, break down into glucose and enter the bloodstream relatively quickly. Unrefined, complex carbohydrates, on the other hand, have a low glycemic index and digest more slowly. Diabetic patients should consume food with a low glycemic index because rapid increases in blood glucose exacerbate overproduction of insulin by the pancreas and insulin resistance. Since they both affect the rapidity with which blood glucose rises after a meal, soluble fiber and foods with a low glycemic index confer similar benefits.

During digestion, wave-like currents caused by contractions of the intestinal muscles bring nutrients to the surface of the intestinal wall for absorption. After soluble fiber dissolves in water, however, it traps nutrients inside its gummy gel and slows down considerably while moving through the digestive tract. Inside the gel, nutrients are shielded from digestive enzymes and less likely to reach the wall of the intestines. Dietary sugars like carbohydrates and starch are among the nutrients trapped inside this gel. Consequently, sugar is absorbed into the bloodstream more slowly, blunting the sharp spike in blood glucose typically experienced by diabetic patients after a meal. Fewer spikes in blood glucose lead to greater sensitivity to the action of insulin. Avoiding high peaks and low valleys in blood glucose places less stress on the pancreas and is important not only to diabetics but also to those who want to prevent the development of type 2 diabetes.

Scientists propose one other explanation for soluble fiber's effect on blood glucose. In order for nutrients to be absorbed into the intestines, they must first cross an unstirred water layer covering the surface of the intestines. Soluble fiber thickens this layer, making it more resistant to the movement of nutrients diffusing into the body. Both theories attempt to explain why blood glucose levels rise more slowly when consumed with soluble fiber.

Blood Cholesterol

The link between high blood cholesterol and poor heart health is well-known. Patients with type 2 diabetes, approximately 90% of whom are obese, are at an especially high risk for heart disease. Therefore, it is important to combat diabetes on multiple fronts, not only by watching blood glucose levels but blood cholesterol levels as well. Fortunately, soluble fiber has been shown to lower blood cholesterol, including LDL cholesterol. Some evidence suggests that soluble fiber makes LDL particles less dense and, therefore, less harmful.

Besides trapping fat and cholesterol that would otherwise be digested by the body, there are two proposed mechanisms for the lowering of blood cholesterol by soluble fiber. In the first scenario, soluble fiber traps bile acids in the same way that it traps sugars and carries them out of the body as waste. Bile acids are produced from cholesterol in the liver. Therefore, if bile acids are removed, the body pulls cholesterol from the bloodstream to produce more.

In the second theory, soluble fiber shifts the bile acid pools away from cholic acid and toward another acid (chenodeoxycholic acid) that inhibits an enzyme involved in fat and cholesterol production (3-hydroxy 3 methylglutaryl CoA reductase). Decreased enzyme activity means less cholesterol produced by the liver and lower blood cholesterol levels.

Weight Management

Few aspects of health are more important to a diabetic patient than weight management. The overwhelming majority of diabetic patients are obese. Frustratingly, obese people are at a higher risk for insulin resistance, yet insulin resistance leads to fat storage. For this reason, many patients struggle to maintain a healthy weight.

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Colon Health

Many people who develop type 2 diabetes are obese because of poor nutrition, putting their colons at risk. Soluble fiber makes stool softer and easier to pass, which means less constipation and fewer hemorrhoids. Helpful microorganisms in the intestines feed on 70-80% of dietary soluble fiber and are very important for overall health. If intestinal bacteria are fed properly, they become plentiful and widespread, spreading throughout the GI tract. Increased bacterial production causes increased fecal mass.

The products of fermentation are primarily lactate and short-chain fatty acids, most commonly acetic, butyric, and propionic acids. Short-chain fatty acids aid in the proliferation of mucosal cells that produce mucus for lubrication. They are sources of energy and increase water and sodium absorption. A fatty acid gel moisturizes stool as well as nourishes and protects the intestinal lining of the intestines. Short-chain fatty acids also contribute to glucose metabolism, which may confer additional benefits to diabetic patients.