



## Fibre

**What is it ?** Dietary fibres are structural components of plants. The type and amount of fibre in plants vary from species to species.

Fiber is one of those nutrients that many of us know is important but that remains a bit of a mystery. Exactly what is it? What are the best sources of fiber? And what are its health benefits? Here we try to answer these and other questions.

Basically, the term fiber refers to carbohydrates that cannot be digested. Fiber is present in all plants that are eaten for food, including fruits, vegetables, grains, and legumes. However, not all fiber is the same, and there are a number of ways to categorize it. One is by its source or origin. For example, fiber from grains is referred to as cereal fiber. Another way of categorizing fiber is by how easily it dissolves in water. Soluble fiber partially dissolves in water. Insoluble fiber does not dissolve in water. These differences are important when it comes to fiber's effect on your risk of developing certain diseases.

A common misconception about fiber is that it is not digested by enzymes in the body and therefore provides no calories or nutrients. But the category "fibre" includes chemicals that are not fibrous, materials that can be dissolved, and some substances that can be digested partially. We eat quite a complex mixture of fibers.

Dietary fibre is a broad generic term; it includes the following chemicals, which form the structural components of plants, including many of the plant foods we eat:

- cellulose
- hemicellulose
- lignin
- pectin's
- mucilage's
- gums

The first three are insoluble fibers which can absorb and hold water in the digestive system. The others are soluble fibers, which are partially broken down in digestion to a gel-like substance, which also retains water.

### What does it do?

Fiber's ability to hold water and to bind minerals and cholesterol-like materials results in a number of physiological effects which vary depending on the type of fiber and/or where it is in the digestive tract.

- In the mouth, fiber stimulates the flow of saliva.
- In the stomach and small intestine, fiber dilutes the contents and delays the emptying of food and the absorption of nutrients; this promotes a feeling of fullness.
- In the large intestine, fiber dilutes the contents and provides a place for bacterial growth and digestion. The water-holding capacity of insoluble fiber in the lower intestine softens the stool and increases stool size, so that the process of elimination is easier and faster.
- In the large intestine, fibre also acts to bind certain chemicals. Different kinds of fiber have different binding capacities: when fiber binds cholesterol-like compounds, it lowers cholesterol, a healthy result; when fiber binds minerals, it decreases their absorption, a less desirable result.

Because of these physiological effects, fiber is considered beneficial in preventing, alleviating or curing a number of diseases and conditions, including:

- arteriosclerosis (hardening of the arteries)
- excess food intake
- diverticular disease
- irritable bowel syndrome
- Crohn's disease
- gallstone formation
- constipation

### Where do you get it?

Recent recommendations suggest that we should be getting fiber from a variety of foods high in different types of fibers, rather than from dietary supplements. A healthy diet should provide a mixture of both soluble and insoluble fibers.

About eight grams of daily fiber intake should be in the form of soluble fibers, such as:

- fruits, especially apples and citrus
- vegetables, especially leafy green varieties
- oats

Major sources of insoluble fibers include:

- wheat bran
- whole grains
- legumes
- most fruits and vegetables

A good source of fiber should have at least three grams of fiber. High-fiber foods provide five grams or more. The accompanying chart lists a variety of foods and their fiber content.

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### Sources of Fibre

Food	Amount of fibre (in gms) in a 100g (3.5 ounce) serving
<b>Cereals</b>	
bran cereal	35.3
bran flakes	18.8
cornflakes	2.0
oatmeal	10.6
wheat flakes	9.0
<b>Grains</b>	
barley, (minus its outer covering)      pearled	15.6
cornmeal, whole grain	11.0
de-germed	5.2
oatbran, raw	6.6
rice, raw (brown)	3.5
rice, raw (white)	1.0-2.8
rice, raw (wild)	5.2
wheat bran	15.0
apple (with skin)	2.8
apricots (dried)	7.8
figs (dried)	9.3
kiwifruit	3.4
pears (raw)	2.6
prunes (dried)	7.2
prunes (stewed)	6.6
raisins	5.3
<b>Vegetables</b>	
<b>beans</b>	
• baked (vegetarian)	7.7
• chickpeas (canned)	5.4
• lima, cooked	7.2
broccoli, raw	7.7
brussels sprouts, (cooked)	2.6
cabbage (white) raw	2.4
cauliflower, raw	2.4
corn, sweet, cooked	3.7
peas with edible pods, raw	2.6
potatoes, white, baked, w/skin	5.5
sweet potato, cooked	3.0
tomatoes, raw	1.3
<b>Others</b>	

corn chips, toasted	4.4
<b>nuts</b>	
• almonds, oil-roasted	11.2
• coconut, raw	9.0
• hazelnuts, oil-roasted	6.4
• peanuts, dry-roasted	8.0
• pistachios	10.8

### How much do we need?

A healthy adult should get 20-25 grams of fiber a day, based on the assumption that we need 10-13 grams of fiber a day for every 1,000 calories consumed. Unfortunately, most Americans consume only about 10 grams.

Children ages 3-18 need less fiber than adults, and they need different amounts at different ages. To calculate a child's daily fiber requirements, add the child's age to the number five (for five grams). For example, a four-year-old needs nine grams of fiber a day.

To get the appropriate amount of fiber, adults should include the following in their diets:

- two to three servings of whole grains (as part of the 6-11 recommended daily servings)
- five servings of fruits and vegetables a day
- one or two servings of legumes every week

### Is it safe?

Yes. However, increasing your fiber intake to recommended levels may cause some unpleasant effects unless you do it gradually and drink plenty of water. This can help you avoid:

- gas, distention and/or diarrhea resulting from increases in fiber intake
- colon obstruction caused by very large intakes of fiber
- interference with the absorption of some minerals (though this should not be a problem if you eat a healthy diet.)

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Health Effects of Eating Fiber: Long heralded as part of a healthy diet, fiber appears to reduce the risk of developing various conditions, including heart disease, diabetes, diverticular disease, and constipation. Despite what many people may think, however, fiber probably has little, if any effect on colon cancer risk.

Obesity (Soluble and Insoluble Fiber): Fiber adds bulk to your diet, making you feel full faster. It, thus, can help reduce appetite.

Fiber and Colon Cancer (Only Soluble fiber): For years, Americans have been told to consume a high-fiber diet to lower the risk of colon cancer—mainly on the basis of results from relatively small studies. Larger and better-designed studies have largely failed to show a link between fiber and colon cancer. One of these—a Harvard study that followed over 80,000 female nurses for 16 years—found that dietary fiber was not strongly associated with a reduced risk for either colon cancer or polyps (a precursor to colon cancer). (1) More recently, researchers combined the results of the Harvard study with those of several other large studies that followed more than 700,000 men and women, some for up to 20 years. (2) After accounting for differences in participants' red meat and alcohol intake, as well as other factors that could increase colon cancer risk, high intake of fiber was not found to protect against colorectal cancer.

But just because fiber plays little role in preventing colon cancer doesn't mean you should abandon a high-fiber diet. As explained below, fiber provides many other benefits.

Fiber and Heart Disease (Only Soluble fiber): Coronary heart disease is a leading cause of death for both men and women. This disease is characterized by a buildup of cholesterol-filled plaque in the coronary arteries—the arteries that feed the heart. This causes them to become hard and narrow, a process referred to as atherosclerosis. Total blockage of a coronary artery produces a heart attack.

High intake of dietary fiber has been linked to a lower risk of heart disease in a number of large studies that followed people for many years. In a Harvard study of over 40,000 male health professionals, researchers found that a high total dietary fiber intake was linked to a 40 percent lower risk of coronary heart disease, compared to a low fiber intake. Cereal fiber, which is found in grains, seemed particularly beneficial. A related Harvard study of female nurses produced quite similar findings.

Fiber intake has also been linked with the metabolic syndrome, a constellation of factors that increases the chances of developing heart disease and diabetes. These factors include high blood pressure, high insulin levels, excess weight (especially around the abdomen), high levels of triglycerides, the body's main fat-carrying particle, and low levels of HDL (good)

cholesterol. Several studies suggest that higher intake of cereal fiber and whole grains may somehow ward off this increasingly common syndrome.

Fiber and Type 2 Diabetes (Only Soluble fiber): Type 2 diabetes is the most common form of diabetes. It is characterized by sustained high blood sugar levels. It tends to develop when the body can no longer produce enough of the hormone insulin to lower blood sugar to normal levels or cannot properly use the insulin that it does produce.

There are several important factors that may help lower your risk for type 2 diabetes, such as maintaining a healthy weight, being physically active, and not smoking. Researchers are also trying to pinpoint any relevant dietary factors, one of which seems to be a high-fiber diet. The Harvard studies of male health professionals and female nurses both found that a diet high in cereal fiber was linked to a lower risk of type 2 diabetes. Other studies, such as the Black Women's Health Study and the European Prospective Investigation Into Cancer and Nutrition–Potsdam, have found similar results.

When it comes to factors that increase the risk of developing diabetes, a diet low in cereal fiber and rich in high-glycemic-index foods (which cause big spikes in blood sugar) seems particularly bad. Both Harvard studies—of nurses and of male health professionals—found that this sort of diet more than doubled the risk of type 2 diabetes when compared to a diet high in cereal fiber and low in high-glycemic-index foods.

One question raised by such studies is whether fiber itself protects against heart disease and diabetes, or whether the disease-fighting benefits accrue from the nutrient-rich whole grain package. A recent meta-analysis of seven major studies showed that cardiovascular disease (heart attack, stroke, or the need for a procedure to bypass or open a clogged artery) was 21 percent less likely in people who ate 2.5 or more servings of whole grain foods a day compared with those who ate less than 2 servings a week. Another meta-analysis of several large studies, including more than 700,000 men and women, found that eating an extra 2 servings of whole grains a day decreased the risk of type 2 diabetes by 21 percent. So to protect against heart disease and diabetes, perhaps the best advice is to choose whole grain, high-fiber foods at most meals.

Fiber and Diverticular Disease: Diverticulitis, an inflammation of the intestine, is one of the most common age-related disorders of the colon in Western society. In North America, this painful disease is estimated to occur in one-third of all those over age 45 and in two-thirds of those over

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age 85. Among male health professionals in a long-term follow-up study, eating dietary fiber, particularly insoluble fiber, was associated with about a 40 percent lower risk of diverticular disease.

Fiber and Constipation (Insoluble fiber): Constipation is the most common gastrointestinal complaint in the United States and is of particular concern to the elderly.

The good news is that the gastrointestinal tract is highly sensitive to dietary fiber, and consumption of fiber seems to relieve and prevent constipation.

The fiber in wheat bran and oat bran seems to be more effective than similar amounts of fiber from fruits and vegetables. Experts recommend increasing fiber intake gradually rather than suddenly. As fiber intake is increased, the intake of beverages should also be increased, since fiber absorbs water.

The Bottom Line: Recommendations for Fiber: Fiber is an important part of a healthy diet, and you should get at least 20 grams a day, more is better. The best sources are whole grain foods, fresh fruits and vegetables, legumes and nuts. Some tips for increasing fiber intake:

- \* Eat whole fruits instead of drinking fruit juices.
- \* Replace white rice, bread, and pasta with brown rice and whole grain products.
- \* Choose whole grain cereals for breakfast.
- \* Snack on raw vegetables instead of chips, crackers, or chocolate bars.
- \* Substitute legumes for meat two to three times per week in chili and soups.
- \* Experiment with international dishes (such as Indian or Middle Eastern) that use whole grains and legumes as part of the main meal (as in Indian dahls) or in salads (for example, tabbouleh).