HEALTH

Dietary Fiber no. 9.333

by J. Anderson and K.Wilken [1]

Can high-fiber diets really do all they claim to do? Studies have looked at the relationship between high-fiber diets and many diseases, including colon cancer, coronary heart disease and diabetes. Proven benefits of a high-fiber diet include prevention and treatment of constipation, hemorrhoids and diverticulosis. In addition, certain types of fiber help decrease blood cholesterol levels.

Quick Facts...

Fiber may be beneficial in treating or preventing constipation, hemorrhoids and diverticulosis.

Water-soluble fiber helps decrease blood cholesterol levels.

Foods containing dietary fiber include fruits, vegetables, nuts and grains.

Include a variety of high-fiber foods in the diet.

What Is Dietary Fiber?

Dietary fiber comes from the portion of plants that is not digested by enzymes in the intestinal tract. Part of it, however, may be metabolized by bacteria in the lower gut.

Different types of plants have varying amounts and kinds of fiber, including pectin, gum, mucilage, cellulose, hemicellulose and lignin. Pectin and gum are water-soluble fibers found inside plant cells. They slow the passage of food through the intestines but do nothing to increase fecal bulk.

Beans, oat bran, fruit and vegetables contain soluble fiber. In contrast, fibers in cell walls are water insoluble. These include cellulose, hemicellulose and lignin. Such fibers increase fecal bulk and speed up the passage of food through the digestive tract. Wheat bran and whole grains contain the most insoluble fiber, but vegetables and beans also are good sources.

Sometimes there is confusion as to the difference between crude fiber and dietary fiber. Both are determined by a laboratory analysis, but crude fiber is only one-seventh to one-half of total dietary fiber.

Benefits of Fiber

Insoluble fiber binds water, making stools softer and bulkier. Therefore, fiber, especially that found in whole grain products, is helpful in the treatment and prevention of constipation, hemorrhoids and diverticulosis. Diverticula are pouches of the intestinal wall that can become inflamed and painful. In the past, a low-fiber diet was prescribed for this condition. It is now known that a high-fiber diet gives better results once the inflammation has subsided.

Low blood cholesterol levels (below 200 mg/dl.) have been associated with a reduced risk of coronary heart disease. The body eliminates cholesterol through the excretion of bile acids. Water-soluble fiber binds bile acids, suggesting that a high-fiber diet may result in an increased excretion of cholesterol. Some types of fiber, however, appear to have a greater effect than others. The fiber found in rolled oats is more effective in lowering blood cholesterol levels than the fiber found in wheat. Pectin has a similar effect in that it, too, can lower the amount of cholesterol in the blood.

Other claims for fiber are less well founded. Dietary fiber may help reduce the risk of some cancers, especially colon cancer. This idea is based on

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information that insoluble fiber increases the rate at which wastes are removed from the body. This means the body may have less exposure to toxic substances produced during digestion. A diet high in animal fat and protein also may play a role in the development of colon cancer.

High-fiber diets may be useful for people who wish to lose weight. Fiber itself has no calories, yet provides a "full" feeling because of its water-absorbing ability. For example, an apple is more filling than a half cup of apple juice that contains about the same calories. Foods high in fiber often require more chewing, so a person is unable to eat a large number of calories in a short amount of time.

Sources of Fiber

Dietary fiber is found only in plant foods: fruits, vegetables, nuts and grains. Meat, milk and eggs do not contain fiber. The form of food may or may not affect its fiber content. Canned and frozen fruits and vegetables contain just as much fiber as raw ones. Other types of processing, though, may reduce fiber content. Drying and crushing, for example, destroy the water-holding qualities of fiber.

The removal of seeds, peels or hulls also reduces fiber content. Whole tomatoes have more fiber than peeled tomatoes, which have more than tomato juice. Likewise, whole wheat bread contains more fiber than white bread. Table 1 lists the dietary fiber content of some common foods.

How Much Fiber?

Currently no Recommended Dietary Allowances (RDAs) for fiber exist. The average American consumes 14 grams of dietary fiber per day. People with high cholesterol levels or diverticulosis may benefit from a diet that contains up to 40 grams per day.

For many people this requires major changes in eating habits. The use of whole grains, fruits, vegetables and dried beans must be greatly increased. These changes should be made gradually to avoid problems with gas and diarrhea. Anyone with a chronic disease should consult a physician before greatly altering a diet.

For children, the suggestion is to eat 5 grams plus their age. For example, a 12-year-old should eat 17 grams of fiber per day (5 + 12).

Food Labeling of Fiber

Nutrients required on food labels reflect current public health concerns and coincide with current public health recommendations. Nutrition labels now list a Daily Reference Value (DRV) for specific nutrients, including fiber. The DRV for fiber is 25 grams per day based on a 2,000 calorie diet, or 30 grams per day based on a 2,500 calorie diet. The fiber content of a food is listed in grams and as a percentage of the daily value.

Figure 1 shows a food nutrition label. It tells you the product provides 3 g of fiber in a half cup serving. The percent Daily Value for one serving is 12 percent, or 12 percent of DRV of 25 grams based on a 2,000 calorie diet.

Specific health claims can be made for food products that meet specific requirements. For example: "Diets low in saturated fat and cholesterol and rich in fruits, vegetables and grain products that contain fiber, particularly soluble fiber, may reduce the risk of coronary heart disease." In order to make a health claim about fiber and coronary heart disease, the food must contain at least 0.6 g of soluble fiber per reference amount. The soluble fiber content must be listed and cannot be added or fortified. A product containing a health claim for fiber and coronary heart disease must also meet the definitions of a low fat, low in saturated fat and low in cholesterol product.

A statement such as "made with oat bran" or "high in oat bran" implies that a product contains a considerable amount of the nutrient. Claims that imply

Nutrition Facts

Serving Size ½ cup (114g)
Servings Per Container 4

Amount Per Serving

Calories 90 Calories from Fat 30

	% Daily Value*
Total Fat 3g	**5**%
Saturated Fat 0g	**0**%
Cholesterol 0mg	**0**%
Sodium 300mg	**13**%
Total Carbohydrate 13g	**4**%
Dietary Fiber 3g	**12**%
Sugars 3g	
Protein 3g	

Vitamin A 80% • Vitamin C 60%
Calcium 4% • Iron 4%

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrates			
Dietary Fiber		25g	30g

Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4

Figure 1: A food nutrition label.

Table 1: Dietary fiber content of foods.

	Serving size	Fiber (grams)
Breads, cereals, grains		
White bread	1 slice	0.7
Whole grain bread	1 slice	2.1
100% All Bran	1/3 cup	5.1
Corn Flakes	3/4 cup	2.3
Shredded Wheat	1 biscuit	3.1
Oatmeal, cooked	1 cup	1.9
Rice, brown, cooked	1/3 cup	1.6
Rice, white, cooked	1/3 cup	0.5
Fruit		
Apple	1/2 large	2.0
Apricots	2	1.4
Banana	1/2 medium	1.5
Blackberries	1/2 cup	5.3
Dates	2	1.6
Grapes	10	0.5
Grapefruit	1/2	0.5
Melon	1 cup	1.5
Nectarine	1	3.3
Orange	1 small	2.0
Peach	1	1.6
Pear	1 medium	2.0
Pineapple	1/2 cup	0.8
Plums	3 small	1.8
Prunes	2	2.4
Raisins	1 1/2 T	1.0
Strawberries	1 cup	3.1
Vegetables		
Beans, baked	1/2 cup	9.3
Beans, green	1/2 cup	2.1
Beets	1/2 cup	2.1
Broccoli	1/2 cup	3.5
Cabbage	1/2 cup	2.1
Carrots	1/2 cup	2.4
Cauliflower	1/2 cup	1.6
Celery	1/2 cup	1.1
Corn	1/2 cup	4.7
Lentils, cooked	1/2 cup	3.7
Lettuce	1/2 cup	0.8
Peas	1/2 cup	1.4
Potato, baked	1/2 medium	1.9
Sweet potato	1/2 medium	2.1
Tomato	1 small	1.5
Winter squash	1/2 cup	3.5
Zucchini squash	1/2 cup	2.0
Other foods		
Meat, milk, eggs		0
Nuts	2 T	2.2
Almonds	2 T	1.5
Peanuts	2 T	0.8

a product contains a particular amount of fiber can be made only if the food actually meets the definition for “high fiber” or “good source of fiber,” whichever is appropriate.

The following terms describe products that can help increase fiber intake:

High fiber	5 g or more per serving
Good source of fiber	2.5 g to 4.9 g per serving
More or added fiber	At least 2.5 g more per serving than the reference food

Although fiber is important, it is just one part of a properly balanced diet. It is possible that too much fiber may reduce the amount of calcium, iron, zinc, copper and magnesium that is absorbed from foods. Deficiencies of these nutrients could result if the amount of fiber in the diet is excessive, especially in young children.

Fiber supplements are sold in a variety of forms from bran tablets to purified cellulose. Many laxatives sold as stool softeners actually are fiber supplements. Fiber’s role in the diet is still being investigated. It appears that the various types of fiber have different roles in the body.

For these reasons, avoid fiber supplements. Instead, eat a variety of fiber-rich foods. This is the best way to receive the maximum benefits from each type of fiber present in foods, and obtain necessary nutrients.

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