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StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-.

High Fiber Diet

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Last Update: May 1, 2023.

Definition/Introduction

A high fiber diet refers to a diet that meets or exceeds the Dietary Reference Intake (DRI) for dietary fiber set by the United States Institute of Medicine (IOM).

The current daily DRIs for fiber are as follows[1][2]:

- Children ages 1 to 3 years: 14 grams (g)
- Girls 4 to 8 years: 16.8 g
- Boys 4 to 8 years: 19.6 g
- Girls 9 to 13 years: 22.4 g
- boys 9 to 13 years. 25.2
- Girls 14 to 18 years: 25.2 g
- Boys 14 to 18 years: 30.8 g
- Women aged 19 to 50 years: 25 g
- Men aged 19 to 50 years: 38 g
- Women aged 51 and older: 21 g
- Men aged 51 and older: 30 g

Issues of Concern

Most Americans consume only half the levels of recommended fiber per day, which is almost 15 grams per day.

There is not a single universally accepted definition for fiber. In 1953, Hinsley first defined dietary fiber as a “non-digestible constituent that makes up the plant cell wall.”[3] Since then, the definition of dietary fiber has been promulgated in various ways by different countries and organizations.[4] [5] Defining fiber is elusive because new compounds are identified that have chemical properties of fiber but lack its physiological properties or vice versa. People eat fiber for its health benefits; therefore, it is preferable to have a definition of fiber based on its physiological properties, but for food industries, scientists and researchers prefer to rely on definitions set by the Association of Official Analytical Chemists (AOAC).[6][7] All existing definitions recognize fiber as “carbohydrate

or lignin which bypasses digestion in the small intestine and is partially or completely fermented in large intestine or colon."[8][5]

Dietary fibers are defined as follows:

Based on availability in nature,

1. Dietary fiber: This consists of non-digestible carbohydrates and lignin that are intrinsic and intact in plants. The term non-digestible refers to the material that is not digested or absorbed in the human small bowel. Non-digestible plant carbohydrates are components of the plant cell walls and intercellular structures that maintain their three-dimensional properties even after mechanical treatment.[9][10]
2. Added fiber: These are indigestible carbohydrates isolated or extracted from animal or plant sources and have beneficial physiological effects in humans. These include attenuation of blood glucose and cholesterol levels and improved laxation. Synthetically manufactured non-digestible carbohydrates like resistant starch are also included in this category. An essential aspect of defining added fiber relative to its physiological benefits is that extraction or isolation of fiber by chemical means can either enhance or diminish its beneficial effects. Any fiber synthesized in the lab cannot be listed under fiber until it demonstrates the health benefits.[9][10]

Based on physicochemical properties;

1. Soluble fiber: They are water-soluble and derived from the inner flesh of plants such as pectin, gums, and mucilage. They form a viscous gel and are usually fermented by bacteria in the colon into gases and by-products such as short-chain fatty acids. They alter the blood glucose and cholesterol concentrations.[5] Sources of soluble fibers are:

- Fruits
- Oat
- Barley
- Legumes, peas, and beans
- Vegetables such as broccoli and carrots
- Most root vegetables

2. Insoluble fibers: They derive from the outer skin of plants. They are insoluble in water and usually cannot undergo fermentation by bacteria in the colon. As a result, they form the bulk of the stool and promote laxation. Cellulose, hemicellulose, and lignin are insoluble fibers.[5] Sources of insoluble fiber are:

- Cellulose: Corn bran, potatoes, and skin of most fruits from trees such as apples, banana, and avocado, many green vegetables such as zucchini, green beans, celery, and cauliflower, some fruit plants such as tomatoes and kiwi.
- Hemicellulose: whole grains
- Lignin: nuts and seeds

Clinical Significance

A high-fiber diet has the following health benefits:

1. Bowel movement: Insoluble fiber maintains bowel movements. They absorb water and softens the stool. Soft stool is easier to pass, thus preventing constipation. They also add bulk to the stools hence prevent the formation of loose stools.[11]
2. Improved bowel health: High fiber diet prevents the formation or worsening of hemorrhoids and diverticular disease, which presents as outpouchings in the colon walls.
3. Studies have shown that a high-fiber diet decreases the risk of colorectal cancer.[12]
4. Cholesterol-lowering effects: Soluble fibers bind to cholesterol molecules in the small intestine and prevent their absorption. The cholesterol-lowering properties of soluble fibers help to prevent coronary heart disease.[13]
5. Postprandial glucose and insulin levels: Soluble fibers slow the absorption and digestion of carbohydrates and lower insulin demand in the body, thereby stabilizing postprandial glucose levels.[14][15][16]
6. Improved satiety and weight loss: Soluble fibers make the stomach contents viscous and prolong gastric emptying time. Studies have shown this to help reduce weight, improve BMI, lower body fat, and waist-to-hip ratio.[17]
7. Cancer prevention: Some studies have shown that soluble fibers such as pectin have antioxidant properties and lower the risk of other types of cancer, including breast cancer.[18]
8. Helps to live longer: Fiber intake is associated with decreased prevalence of diabetes type 2, coronary heart disease, stroke, and improved immune function.[19][17]

Nursing, Allied Health, and Interprofessional Team Interventions

In the United States, almost half of all individuals carry a diagnosis of pre-diabetes, diabetes, or metabolic syndrome.[20] A high fiber diet is associated with physiological health benefits, not just limited to weight loss. An average person in the US consumes about 15 grams of fiber per day, which is only barely half the recommended amount. Diets rich in fiber include the Mediterranean diet, cereals, oat, etc. The Mediterranean diet consists of fruits, vegetables, fish, olive oil, legumes, and beans. The current complex dietary guidelines can be changed to a simpler nutritional approach if dieticians and other health care professionals encourage a shift from the typical Western diet and white flour foods that focus on fiber-rich sources.

Review Questions

- Access free multiple choice questions on this topic.
- Comment on this article.

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Disclosure: Aelia Akbar declares no relevant financial relationships with ineligible companies.

Disclosure: Aparna Shreenath declares no relevant financial relationships with ineligible companies.

Bookshelf ID: NBK559033 PMID: 32644459