Impact of Low Fiber Diet on Gastrointestinal Disorders

Ari Fahrial Syam, Daladiyono
Division of Gastroenterology, Department of Internal Medicine, Faculty of Medicine, University of Indonesia/Dr. Cipto Mangunkusumo General National Hospital, Indonesia

ABSTRACT

Fiber is not digested or absorbed in the small intestine. The main site of action of fiber is in the colon. In the colon, fiber will increase stool output and frequency, increase stool water, dilute the colonic content, reduce the toxins, bile acid, increase colonic fermentation and also stimulate probiotic growth.

Some meta-analysis of observational epidemiologic and case control studies have found a protective effect of dietary fiber against colon cancer that increase with intake. Therefore, the high fiber diet is healthy recommendation to prevent various gastrointestinal disorders.

Keywords: dietary fiber - colon cancer - constipation

INTRODUCTION

There is a current shift in the main cause of mortality and morbidity in Indonesia. Infectious diseases, which had always been the main cause of mortality and morbidity, has shifted and replaced by degenerative diseases such as heart disease, hypertension, diabetes, hypercholesterolemia, uricemia, cancer, and other degenerative diseases. Such condition is especially observable in the cities, particularly in Java. The results of the domestic health survey (Survei Kesehatan Rumah Tangga - SKRT) of the Department of Health of Indonesia in 1995 demonstrated that for the first time in the history of the SKRT, which started in 1972, the domination of infectious diseases in Java and Bali had been replaced by cardiovascular diseases. The results of this survey demonstrated that cause of death is now dominated by cardiovascular disease (24.2%) compared to infectious disease (22.8%).

As a cause of death, cardiovascular diseases do not only hit the elderly, but also has a tendency to affect the young. An important factor as a cause of this change in disease pattern is the unhealthy change in society’s life style, such as lack of exercise, excessive consumption of sugar and fatty foods (high fat and carbohydrate diet), salty foods, lack of fiber, and other unhealthy habits such as cigarette smoking and drinking.

An unhealthy diet could cause diseases such as coronary heart disease, stroke, diabetes, digestive disorders (constipation, hemorrhoids, colon cancer), tooth and gum decay, as well as overweight. How could fiber prevent these diseases? Fiber is a crucial nutritional component in our daily diet. In our digestive system, fiber affects the absorption of nutrients, carbohydrate and fat metabolism, forms feces and increases its excretion, influences various aspects of the structure and defense of the digestive mucosa, and also affects our immune system.

The Transport of Fiber Through The Body

Fiber is not digested or absorbed in the small intestines. The main site of action of fiber is in the colon. As you may know, fiber is classified into soluble and insoluble fibers. Soluble fiber is fermented in the colon, while insoluble fibers play a role in forming the fecal mass. Fermentation of the fiber occurs in the upper colon, while feces formation occurs in the distal colon.

Carbohydrate fermentation that occurs is conducted by normal (probiotic) bacterial micro flora of the colon. This micro flora completes the final digestion through this fermentation process. Aside from playing a role in carbohydrate fermentation, the micro flora also protects the colon from pathogens. During the carbohydrate fermentation, short chain fatty acids are produced, which act as an energy source for the health of the colon, stimulating water and salt absorption, improving blood
flow, reducing colon acidity, and maintaining the integrity of the colon wall.4

In addition to forming fecal mass, unfermented fiber also plays a role in shortening colonic transit time. This effect prevents exposure of the colon wall to toxic and carcinogenic substances that need to be promptly removed from the body.3

The role of fiber on the digestive tract can be found in Table 1.

Digestive Disorders Attributed to a Low Fiber Diet

The epidemiological study by Burkitt et al in 1971 is a landmark in raising our awareness on the benefit of fiber for our health, particularly for our digestive tract. The study performed on Africans demonstrated that black Africans that consumed a high fiber low fat diet had a low mortality rate due to colon cancer compared to white Africans with a low fiber high fat diet. The results of this study demonstrated that a high fiber diet has a protective effect for the incidence of colon cancer.5

Table 1. The Effect of Fiber in The Digestive Tract3

<table>
<thead>
<tr>
<th>Small intestines</th>
<th>Large intestines</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Reduced blood cholesterol and triglyceride levels</td>
<td>• Reduced in colonic transit time</td>
</tr>
<tr>
<td>• Reduced the effect of blood sugar in carbohydrate-containing meals</td>
<td>• Increased the bowel frequency and volume</td>
</tr>
<tr>
<td>• Decreased calcium, magnesium, and iron resorption</td>
<td>• Increase the water in stool</td>
</tr>
</tbody>
</table>

Table 2. Complication of Constipation

| Hemorrhoid | Anal fissure | Diverticule | Lower colon ulcer | Hardened feces | Colon strangulation | Colon rupture | Chronic colon inflammation | Difficulty urinating |

If the cause of constipation is a low fiber intake, increased fiber intake of 20-30 grams could usually alleviate the condition. Fiber intake increase fecal mass, bowel frequency and reduces transit time through the digestive tract. Water intake should also be increased to alleviate the condition. Thus, the complications of constipation could be prevented.

Another bowel disease that is rarely found in Indonesia is Inflammatory Bowel Disease (IBD), which usually causes patients to come with complaints of chronic diarrhea accompanied with bloody stools with mucus. Once the patient’s condition settles, he or she is advised to increase fiber intake to prevent recurrence and severe complaints. The high fiber diet recommended includes foods containing flour, nuts, fruits, vegetables, and potatoes. The reason for the choice of these foods

Table 2. Complication of Constipation

| Hemorrhoid | Anal fissure | Diverticule | Lower colon ulcer | Hardened feces | Colon strangulation | Colon rupture | Chronic colon inflammation | Difficulty urinating |

If the cause of constipation is a low fiber intake, increased fiber intake of 20-30 grams could usually alleviate the condition. Fiber intake increase fecal mass, bowel frequency and reduces transit time through the digestive tract. Water intake should also be increased to alleviate the condition. Thus, the complications of constipation could be prevented.
is because bowel fiber ties the toxins that aggravate inflammation in IBD.9

CONCLUSION
In relation to the digestive tract, fiber is generally classified into soluble and insoluble fiber. These two kinds of fiber have separate roles that are important not only for the health of the digestive tract, but also for the general healthy body.

Fiber plays a role in the formation of fecal mass, reducing fecal excretion, reducing toxins and unused substances from the colon, plays a role as a prebiotic, to increase carbohydrate fermentation, and to reduce the levels of cholesterol, triglyceride, and blood sugar.

Inadequate fiber consumption may cause various diseases to develop in the gastrointestinal tract as well as its complications. A low fiber diet is associated with increased prevalence of colon cancer. Thus, a high fiber diet of 30 grams/day and adequate water intake is a healthy recommendation for us to avoid various diseases and to a better performance of our daily life.

REFERENCES