

# agMOOCs

## Fiber

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Hello everybody. In the last few classes we have spoken about carbohydrates and in the carbohydrate I was telling you about the available and unavailable carbohydrates. And the unavailable carbohydrates is mostly the food that is not digested in the gastrointestinal tract so which is called as fiber.



So let us see what is fiber and what are the significant characteristics of fiber in our food.

## What is Dietary Fibre?

- Non –digestible part of plant foods
- Consists of one or more of edible CHO polymers and synthetic CHO polymers

So what is dietary fiber? It is the non-digestible part of the plant foods and it consists of one or more edible carbohydrates or their polymers, synthetic carbohydrate polymers, etcetera.

## Types of Dietary Fiber

- There are many different types of fiber, in general fibers can be divided into two types based on their physical properties.

- Soluble fibers ✓
- Insoluble fibers ✓

Soluble fiber can be found in foods such as oatbran, barley, nuts, seeds, beans, lentils, fruits (citrus, apples), strawberries and many vegetables



Insoluble fiber is found in foods such as whole wheat and whole grain products, vegetables, and wheat bran



Now the types of dietary fiber. There are many types of fiber in general the fibers can be divided into two types based on their physical properties. One is the soluble fiber and the other one is the insoluble fiber. So soluble fiber you can find in foods like oat bran, barley, nuts, seeds, beans, lentils, fruits, strawberries and many vegetables like this and insoluble fiber is found in foods such as whole grains. It may be whole wheat, whole millets and whole grain products, vegetables, wheat bran, etc.

## Soluble Fibers

- Soluble fibers dissolve in water, form gels and are easily digested by bacteria in the lower intestine.
  - Provides a feeling of fullness.
  - Slow down the rate food leaves the stomach.
  - May have a role with heart disease, diabetes and colon cancer
- Found in legumes and fruits

Now the soluble fibers these fiber dissolve in water. They form gel and they are easily digested by the bacteria in the lower part of the intestines. And they provide a feeling of fullness. They slow down the rate of food that leaves the stomach that means you have a feeling of fullness in the stomach and may have a role in the prevention of heart disease, diabetes, and colon cancer. And these are mostly found in legumes and fruits.

## Insoluble Fibers

- Insoluble fibers absorb water and swell up resulting in a larger softer stool that is easier and quicker to pass.
  - Provides a feeling of fullness
  - Helps with intestinal function
  - May help with colon cancer
- Found in grains and vegetables

Whereas insoluble fibers, these absorb water and they swell up resulting in larger softer stools that are easier and quicker to pass. So they relieve us from constipation and they provide a feeling of fullness. Again helps with the intestinal function and may also prevent colon cancer. So these insoluble are found in grains and vegetables.

## Recommended allowances

- The National Research Council set a Dietary Reference Intake (DRI) for dietary fiber.
- An adequate Intake (AI) for dietary fiber was set at 20 grams dietary fiber per 1,000 calories.
- Thus for a reference 2,000 calorie diet recommended intake would be 40 grams per day.

Now recommended allowance of fiber. The National Research Council has set a dietary reference intake for dietary fiber. So an adequate intake of dietary fiber was set as 20 grams for every 1000 kilocalories that means for a 2000 kilocalorie diet an individual requires about 40 grams of fiber per day.

## Problems due to excess intake of Fiber in the diet

- Dietary fiber can bind some minerals and decrease their absorption. However, if mineral intake is adequate a recommended dietary fiber intake will not compromise mineral balance.
- Fiber intake is like all nutrients - “more” is not always “better.” Consuming a diet that provides a variety of nutrients is the key.

Now just because we say that fiber is good for relieving constipation. It is good for heart and all what is the amount of that has to be taken if it is it problematic if you take excess amount of fiber in the diet. Yes because dietary fiber can bind some minerals. It makes the minerals like iron, calcium, unavailable to the body and they decrease their absorption because the transit time is decreased. Therefore, these minerals are not absorbed. However, if mineral intake is adequate if you take adequate amount of mineral intake, then the fiber will not compromise the mineral balance. Now fiber intake is like all the nutrients. More is not always better. And consuming a diet that provides a variety of nutrients is the key for a good diet.

Now problems due to lack of fiber in the diet. Does this cause a problem? So constipation is a condition which there is a difficulty in emptying the bowels and usually associated with hardened stools.



## Problems due to lack of fiber in the diet

**Constipation** a condition in which there is difficulty in emptying the bowels, usually associated with hardened faeces.



Now causes of constipation. Now our busy schedule and modern lifestyle may be responsible for causing more incidence of constipation. So this causes is not eating enough fiber in our diet, not drinking enough water. We generally neglect drinking water and not getting enough of exercise and not taking time to respond to an unmistakable urge to go to the toilet. Later body gives us signals but if this signal is not responded to it leads to constipation.

## Causes of constipation

- Our busy, modern lifestyles may be responsible for most cases of constipation
  - not eating enough fibre or drinking enough water,
  - not getting enough exercise, and
  - not taking the time to respond to an unmistakable urge to go to the toilet.

Then fiber and health both the types of fiber are important for health and this fiber is very important in different conditions like constipation, diarrhea, and diverticular disease, heart disease, diabetes, and colon cancer. So fiber is the only factor which is involved in these conditions.

## Fiber and Health

- Both fiber types are important for health.
- Fibers are beneficial for many conditions:
  - constipation,
  - diarrhea,
  - diverticular disease,
  - heart disease,
  - diabetes and
  - colon cancer.
- Fiber is only one factor involved in these conditions.

Role of fiber and intestinal function. The insoluble fibers as earlier discussed it absorbs water resulting in a larger and softer stool so that stools become easier to eliminate from the gastrointestinal tract. So this helps in preventing the constipation or preventing hemorrhoids in the large intestine or the anal canal and also prevents the diverticular disease. Diverticular disease is when the residue, food residue remains in the large intestine there are certain pockets formed in the large intestine and the food residue enters into this and it becomes painful and sometimes it requires surgical treatment for removing this diverticular. So when these stools are soft and they are easily eliminated this can be prevented.



## Role of fibre in Intestinal Function

- Insoluble fibers absorb water resulting in a larger, softer stool that is faster and easier to eliminate, which can help with:
  - Constipation
  - Hemorrhoids
  - Diverticular disease

Now role of fiber in colon cancer. Both insoluble and soluble fibers may protect against colon cancer. Now insoluble fiber absorb water making it larger softer stools which will dilute the potential carcinogen. See if the residue remains for a longer time in the larger intestine then there are some carcinogens which also may be absorbed into the large intestine and cause cancer. So it dilutes the potential carcinogen. Then reduces the transit time. When the stools become softer they do not remain in the large intestine for a longer time. So the transit time is decreased. Therefore, the large intestine is not exposed to these carcinogens and may protect the cancer. Now soluble fiber they bind bile acid and potential carcinogens and help in excretion from the large intestine.

## Role of fibre in Colon Cancer

- Both insoluble and soluble fibers may protect against colon cancer
  - Insoluble fibers absorb water making a larger, softer stool which can:
    - Dilute potential carcinogens
    - Reduce transit time so the colon is exposed to any cancer causing substance for less time.
  - Soluble fibers can bind bile acids, potential carcinogens, and increase their excretion.

Now fiber also has an important role in preventing heart disease. So soluble fibers can bind the bile acids and increase their expression and this bile acids can be excreted along with the cholesterol. It also binds with the cholesterol and excretes from the body. Therefore it does not cause a condition called atherosclerosis. This atherosclerosis is a condition where the fat is accumulated in the walls of the blood vessels. So this condition can be prevented and also a fewer bile acids in the intestine, the fat is less absorbed. So excess fat is not absorbed if there is no sufficient bile and also by increasing the bile acid secretion the liver must help in the removal of the cholesterol.

## Role of fibre in Heart Disease

- As mentioned, soluble fibers can bind to bile acids and increase their excretion.
- With fewer bile acids in the intestine, less fat is absorbed.
- Also by increasing bile acid excretion, the liver must use its cholesterol to make new bile acids.



Role of fiber in diabetes. Soluble fibers may have a favorable effect on the blood glucose level. So these soluble fibers when they absorb water and form gel so they decrease the rate of the glucose from the food that is released into the stomach. And there is delay in the glucose absorption into the blood. So this may prevent wide swings of blood glucose throughout the day. So you can see all the nuts, whole grains that are rich in fiber.

## Role of fibre in Diabetes

- Soluble fibers may have a favorable effect on blood glucose.
- Soluble fibers decrease the rate at which food is released from the stomach and delays glucose absorption into the blood.
- This may help prevent wide swings in blood glucose throughout the day.



And then fiber also has an important role in weight management. So foods that are rich in complex carbohydrates they tend to be low in fat and added sugars or the release of the sugars is very slow. So this can help in weight management and providing fewer calories. In addition to the fiber they absorb water, they swell up creating a feeling of fullness. So there is no extra intake of food now because the fibers swells and fills up the stomach. So you have a feeling of satisfaction and also there is a delaying in hunger. This also again helps in the weight management. The weight management is better when you consume more of fiber in your diet.

## Role of fibre in Weight Management

- Foods rich in complex carbohydrates tend to be low in fat and added sugars which can help with weight management by providing fewer calories.
- In addition, as fibers absorb water they swell up creating a feeling of fullness and delaying hunger.



What are the food sources we are talking so much about fiber. Let us see what are the food sources. So foods that our best source of fiber they have both soluble and insoluble fibers. So food sources of fibers include more of fruits and vegetables, whole grains cereals, legumes, nuts and seeds. They are now cooking process and removing peels. Today we see even apple is peeled and eaten so when you remove the peels of vegetables and the fruits it can lower the fiber content from the food. So therefore fiber is very important in the diet and it has a role in reducing so many lifestyle disorders like cancer, then constipation, and heart disease and diabetes. Therefore let us include more of fiber in our diet and to know that we have seen the food sources and the advantages of fiber.

## Food sources

- Foods are the best source of fiber, get both soluble and insoluble fiber.
- Food sources of fiber include fruits, vegetables, whole grain products, legumes, nuts and seeds.
- Cooking processing and removing peels can lower fiber content.



Thank you.