

The Power of Dietary Fibers: How They Benefit Your Health and Well-Being

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Abstract

Dietary fibers are a group of nutrients found in plant-based foods that are essential for maintaining optimal health and well-being. There are two main types of dietary fibers: soluble and insoluble fibers, each with its unique health benefits. Soluble fibers are found in fruits, vegetables, and grains and are beneficial for reducing cholesterol levels, improving blood sugar control, and reducing the risk of heart disease. Insoluble fibers are found in whole grains, nuts, and seeds and are essential for promoting regular bowel movements, preventing constipation, and reducing the risk of colon cancer. They play a vital role in digestive health, weight management, blood sugar control, and reducing the risk of chronic diseases such as heart disease, diabetes, and cancer.

Introduction

Dietary fibres are the edible parts of the plant or analogous carbohydrates that are resistant to digestion and absorption in human small intestine with complete or partial fermentation in large intestine (AACC,2000). As per Trowell et al. (1985) "Dietary fibres consists of remnants of plant cells resistant to hydrolysis (digestion) by the alimentary enzyme of man", whose products are cellulose, hemicellulose, lignin, oligosaccharides, pectins, gums and waxes.

Recommendation: As per Food and Nutrition Board Institute of Medicine 2001, Recommended dietary allowance of dietary fibres for men is around 25g/day (age <50) and 21g/day (age >50) while for women 38g/day (age <50) and 30g (age >50).

Classification of Dietary Fibres

Dietary fibres are classified on the basis of solubility and fermentability.

Water insoluble / less fermented dietary fibres:

Mainly cellulose, hemicellulose and pectin are categorised as insoluble or less fermented dietary fibres.

Cellulose: It is main component of plants, made up of thousands liner glucose residue consisting of β - (1→4) glycosidic linkage. It provides the mechanical strength to plant cell and resistant to degradation. It

is insoluble in concentrated in alkali while soluble in acid. Some examples are vegetables, sugarbeet and different brans.



Hemicellulose: It is also components of plants and back bone is made up of glucose units linked by β -(1 \rightarrow 4) glycosidic linkage. Mainly xylans and galactans are types of hemicellulose that presents in foods. It is soluble in diluted alkali. Cereals are main sources of hemicellulose.



Lignin: It is the non- carbohydrate cell wall component made up of complex cross-linked phenyl propane polymer. It is resistant to degradation by bacteria. Example: woody plants

Water soluble / more fermented dietary fibres: Mainly pectin, gums and mucilages are mainly categorised in soluble or more fermented dietary fibres.



Pectin: It is the structural component of primary cell wall and middle lamella which is made of a complex of polysaccharides with D-galacturonic acid. It is highly soluble and metabolised by gut microbes.

Examples: Fruits, vegetables, legumes, sugarbeet and potato

β -glucan: It is mainly present in cell wall and endosperm of cereals and made up of D- glucose units linked through β -1-3 and β -1-4 linkages. Some examples are oats and barley. In many bacteria and fungi glucose unit linked by β -1-3 and β -1-6 glycosidic linkages.



Gums: It is secreted at plant injury site by secretory cells. Examples: Leguminous seed (guar, locust bean), sea weed extracts (alginates)

Mucilages: It is synthesized by plants that prevents the desiccation of seeds. Example: Gum acacia

Dietary fibres content of various food sources			
Source	Dietary fibre (g/100 g edible portion)		
	Total	Insoluble	Soluble
Barley	15.64	9.98	5.66
Corn	12.24	11.29	0.94
Oats	10.3	6.5	3.8
Soybean (brown)	21.55	16.55	5.0
Lentil raw	10.43	8.6	1.83
Bitter gourd	3.78	3.10	0.68
Apple	2.59	1.43	1.16
Karonda	7.25	5.87	1.38
Almond	13.06	10.55	2.52

Health Benefits of Dietary Fibres

Promotes digestive health: Dietary fibre is crucial for preserving a healthy digestive system. By giving stools volume and facilitating passage, it aids in preventing constipation. Also, it encourages the development of advantageous bacteria in the gut, which may aid in preventing the establishment of dangerous bacteria that can lead to infections or inflammation.

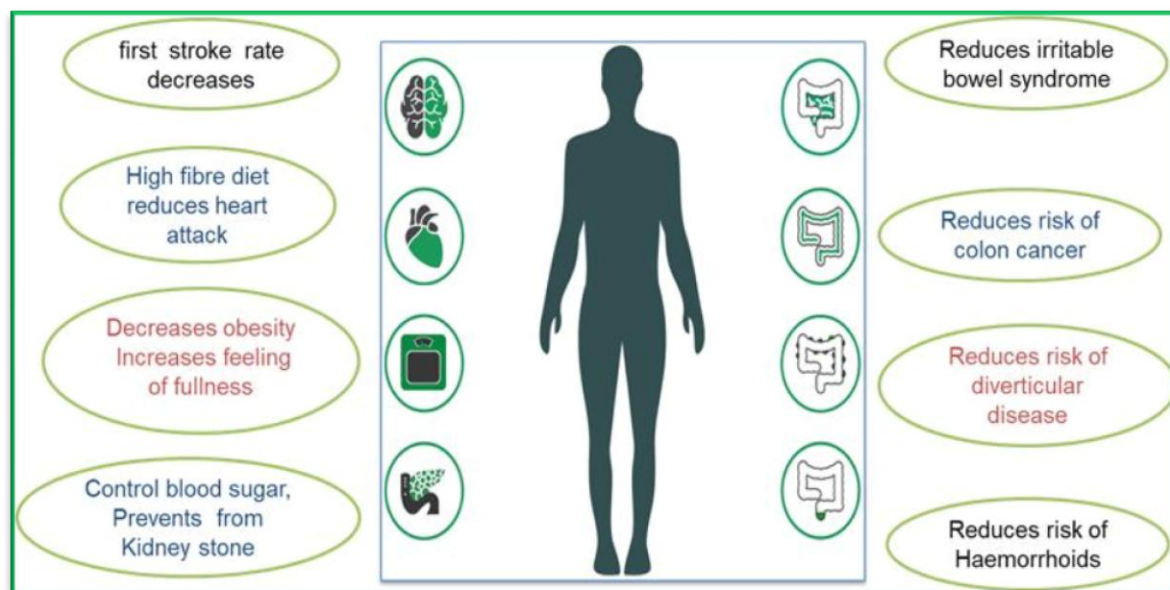


Figure: Health benefits of dietary fibres

Weight management aid: Because high-fiber diet tends to be more filling than low-fiber diets, they can aid in stifling hunger and fostering feelings of satiety. By limiting food consumption and avoiding overeating, this can assist with weight management.

Improve blood sugar control: Fiber may assist to reduce the rate at which sugar is absorbed into the blood, hence reducing the likelihood of blood sugar rises. This is particularly important for people with diabetes, as high blood sugar levels can cause a range of health problems over time.

Reduces blood cholesterol: Studies have indicated that soluble fibre can help lower levels of LDL (bad) cholesterol. Soluble fibre is a fibre that dissolves in water and creates a gel-like material in the digestive tract. The risk of heart disease and stroke can be reduced as a result.

Reduces the risk of certain cancers: Dietary fibre, particularly the kinds found in whole grains, fruits, and vegetables, has been associated with a decreased risk of various malignancies, such as colon cancer and breast cancer.

Conclusion

Dietary fibers are an essential part of a healthy diet and provide numerous benefits for our overall health and well-being. They aid in digestion, reduce the risk of chronic diseases, manage weight, lower blood cholesterol levels, and regulate blood sugar levels. The best sources of dietary fibers are fruits and vegetables, whole grains, nuts and seeds, and legumes. Adding more fiber to our diets can be achieved through gradual introduction of high-fiber foods, meal planning and preparation tips, and supplements. By including more dietary fibers in our daily intake, we can achieve optimal health and vitality.