

DIETARY FIBER

Pages with reference to book, From 28 To 30

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Since the early 70's the West has rediscovered FIBER; but instead of making changes in their diets to increase fiber content, people have turned to Bran and Fiber Pills in the hope of avoiding constipation, diverticular disease, irritable bowel syndrome, obesity, cancer, cardiovascular disease and diabetes. The incidence of these diseases is much lower in the developing countries where the intake of dietary fiber is about five times the intake in industrialised countries. The term "dietary fiber" refers to those parts of the plant cell wall that are not digested by human digestive enzymes. This includes 5 chemically different components — cellulose, hemicellulose, lignin, pectin and gums, which differ in their physical capacity to bind water, form stable gels and bind ions. The proportion in which these components are present will determine their physiological effect.

Physiological Effects of Dietary Fiber:-

1. Increase in fecal bulk due to the water holding capacity of fiber. Fiber from wheat bran has been reported to be twice as effective in increasing fecal bulk as fiber from cabbage, carrots or apples.¹ The increased fecal bulk decreases fecal transit time. A high fiber diet is thus an effective means of preventing and treating constipation and relieves discomfort in patients with irritable bowel syndrome who complained of constipation.² To be effective, a high fiber diet must be accompanied by an adequate intake of water, hence a patient who is advised a high fiber intake must be told to drink plenty of water. Diets low in fiber have been implicated in the etiology of several disorders. The small fecal volume and slow transit time can lead to increased segmentation within the colon with the eventual development of considerable circular muscle thickening and raised intracolonic pressure which could result in the formation of diverticuli; with the rise in the intraluminal pressure during straining to move a small, dry, hard fecal mass, the cardio-oesophageal junction might be forced upward into the thoracic cavity, leading to hiatus hernia; blood may be forced into the superior hemorrhoidal veins leading to hemorrhoids; also venous return from the lower limbs may be impeded resulting in varicose veins.³

II. Lowering of blood cholesterol: Despite its popularity, bran has little effect on serum lipid levels, whereas pectin and legumes exhibit definite hypocholesterolemic properties.⁴ Foods high in pectin are apples, bananas, beans, carrots, cucumbers, squash, sweet potatoes and raisins. All citrus fruits are particularly high in pectin but the pectin is primarily in the white portion of the citrus peel.

III. Reduction in energy intake and utilization:

There is a significant reduction in energy intake and utilization in subjects on diets rich in unrefined carbohydrates and fiber. These foods are not as "energy dense" as foods that are low in fiber and high in refined flour, sugar and/or fat. Compare the calorie value and bulk of a medium sized apple, 60—80 k calories, to that of a popular Pakistani sweet "ghulab jaman", 150-200 k calories. A diet high in fiber ends up being lower in total calories but greater in bulk. Secondly, high fiber foods require greater chewing, resulting in greater secretion of saliva and gastric juice, which distends the stomach and gives an earlier feeling of satiety, thereby reducing food intake. Thirdly, a meal high in fiber results in slower gastric emptying and prolonged satiety. Dietary fiber has also been reported to enhance fecal energy loss.⁵ The sum of these effects could contribute to a decreased incidence of obesity and diabetes, and provide a possible explanation for the difference in colon cancer rates between the industrialized and developing countries, since it has been reported that energy intake is correlated to the incidence of various forms of cancer.⁵ However, since fruits and vegetables high in fiber are very often high in carotenes, the high vitamin A content may also play a protective role with regard to colonic cancer.

Hennekens et al⁶ reviewed the role of carotenoids in the prevention of cancer and found that B-carotenes appear to have a cancer preventive role particularly for all cancer sites of epithelial cell origin. Similarly, low intake of fruits and vegetables that contain vitamin C, have been shown to be associated with higher incidence of human cancer of the stomach, esophagus, larynx and cervix. The American National Academy of Sciences and the American Cancer Society have urged that people increase the intake of fresh fruits and vegetables as a means of reducing the risk of developing cancer.

⁷ Thus different types of high fiber diets have different physiological effects and dependence on bran or ispagol per se may not result in all the beneficial effects observed in populations whose normal diet consists of various high fiber foods. The question is, how best to encourage food patterns within the community so as to meet the nutrient requirements, reduce excessive intake of fats, sugars and cholesterol and increase the intake of fiber and other components that are beneficial for health. The Pakistani diet can be high in fiber. Whole wheat chapatis and red rice form the basic component of the diet for a large majority of our population and are good sources of fiber. These should not be replaced by bread or roti made from “maida” (refined flour) or by polished rice. Another component of our traditional diets has been fiber rich dals and legumes, unfortunately as income increases these are very often replaced by foods such as meat, eggs and milk which are not only lower in fiber but contribute to the cholesterol and saturated fat intake. Similarly, biscuits and other snacks made from refined flour are replacing nutritious, high fiber snacks such as “chana” (gram), “phali” (peanuts) and “bhutta” (corn). It is now fashionable to drink juice rather than eat fruit, resulting in a further loss of fiber. It is generally recommended that the diet should contain 30—40 g dietary fiber per day. In order to maximize the fiber content of the diet, one should use whole grain products and legumes, that is, atta instead of maida, whole masoor or moong rather than masoor or moong dals with their skins removed. Similarly, one should eat the whole fruit or vegetable including the edible skins such as those of apples, pears, potatoes and the membranous parts of citrus fruits. A diet based on 5—6 chapatis with 2—3 servings of legumes and vegetables; a small amount (2—3 oz) of meat, fish, poultry or eggs; a cup of low fat milk and some fruit would provide us with the fiber we need and would also be in keeping with the dietary recommendations to reduce the risk of cardiovascular diseases, cancer and obesity.

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