FIBRALTAR

Instant Galactomannan (1:1) Fiber Drink

FIBRALTAR

FIBRALTAR is as rich as 92% fibre (80% Soluble Fibre and 12% Insoluble Fibre).

The Soluble Fibre in FIBRALTAR is Galactomannan source which extracted from the Fenugreek Seeds.

Fenugreek (also known as Greek Hay and Fenigreek), is an herb that is commonly found growing in the Mediterranean region of the world. While the seeds and leaves are primarily used as a culinary spice, it is also used to treat a variety of health problems in Egypt, Greece, Italy, and South Asia.

Fenugreek seeds have been found to contain protein, vitamin C, niacin, potassium, and diosgenin (which is a compound that has properties similar to estrogen). Other active constituents in fenugreek are alkaloids, lysine and L-tryptophan, as well as steroidal saponins (diosgenin, yamogenin, tigogenin, and neotigogenin).

Fenugreek has three culinary uses: as an herb (dried or fresh leaves), as a spice (seeds), and as a vegetable (fresh leaves, sprouts, and microgreens).Sotolon is the chemical responsible for fenugreek's distinctive sweet smell.

The distinctive cuboid-shaped, yellow-to-amber colored fenugreek seeds are frequently encountered in the cuisines of the Indian subcontinent. The seeds are used in the preparation of pickles, vegetable dishes, daals, and spice mixes, such as panchphoron and sambar powder. Fenugreek seeds are used both whole and in powdered form and are often roasted to reduce their bitterness and enhance their flavor.

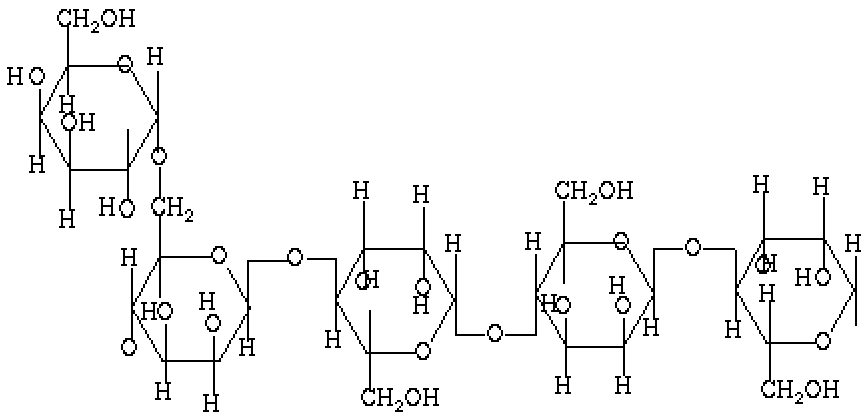
Fenugreek is also used as a vegetable. Fresh fenugreek leaves are an ingredient in some Indian curries.Galactomannan, a water-soluble heteropolysaccharide, was isolated from the seed of Chinese traditional medicine fenugreek.

INTRODUCTION:

Galactomannans are major polysaccharide species found in fenugreek seeds and, represent ~50% of the seed weight (Raghuram et al., 1994). They are an integral component of the cell walls in the seed endosperm (Meier and Reid, 1977).

Their structure is composed of a 1→4 linked β-Dmannosyl backbone with single unit galactose side-chains, α-linked at the O-6 oxygen. Fenugreek galactomannans is considered unique due to a 1:1 to 1.2:1 ratio of galactose to mannose (G:M) molecules (Andrews et al., 1952). This high ratio of galactose substitution helps galactomannans to adsorb water allowing them to form highly viscous solutions at relatively low concentrations resulting in reduced glucose absorption within the digestive tract

(Raghuram et al., 1994). This property of fenugreek gum (Galactomannan) is under exploited in the global food industry (Ramesh et al., 2001) and offers unique opportunities for use in control of caloric intake by targeted groups of consumers.



FIBRALTAR is processed to remove the chemical compounds that cause the characteristic odor of fenugreek. By using proprietary, high-tech manufacturing procedures, we are able to create a deodorized product high in galactomannan, a soluble fiber.

Dietary fiber, **dietary fibre**, or sometimes **roughage** and **ruffage** is the indigestible portion of plant foods having two main components:

- **Soluble** fiber dissolves in water. It is readily fermented in the colon into gases and physiologically active byproducts, and can be prebiotic and/or viscous. Soluble fibers tend to slow the movement of food through the system.

- **Insoluble** fiber does not dissolve in water. It can be metabolically inert and provide bulking or prebiotic, metabolically fermenting in the large intestine. Bulking fibers absorb water as they move through the digestive system, easing defecation.Fermentable insoluble fibers mildly promote stool regularity, although not to the extent that bulking fibers do, but they can be readily fermented in the colon into gases and physiologically active byproducts. Insoluble fibers tend to accelerate the movement of food through the system.

PHARMACOLOGY & ACTION:

The dietary significance of the gums is associated to their effects at various sites in the gastrointestinal tract from the stomach to the large intestine. Most of their actions in the upper gut have been related to their ability to produce high viscosity (at low concentration) in the gut lumen, thereby significantly affecting the nutrient absorption and postprandial plasma nutrient levels. The other beneficial effects are related to the fermentation of gums by microflora in the large intestine (Edwards, 2003).

Fenugreek Galactomannan swells instantaneously in the presence of moisture upon reaching the stomach, resulting in an increase in viscosity that slows gastric emptying. It also thickens intestinal contents that lead to a delay in glucose absorption, resulting in a decrease in blood sugar spikes following a meal (Acatris, 2003). Slowed gastric emptying also generates a feeling of fullness and suppresses appetite, which promotes weight loss. The unique ratio of fenugreek's Galactomannan explains its more stable molecular structure that is more resistant to degradation by digestive enzymes. Therefore, fenugreek Galactomannan has more persistent water-binding activity in the stomach and intestines, which is an essential characteristic for attaining health benefits (Acatris, 2003).

The chemical and physico-chemical nature (lipid, protein, carbohydrate) of the meal will also influence the gastric emptying of the food multiphase system. Fatty foods and hypertonic solutions empty slowly. The movement of food, i.e., chyme, along the gastrointestinal tract is typical of flow in a disperse system. As chyme moves along the gastrointestinal tract, polymer flow and diffusion becomes important.[1]

Following a meal, the stomach and upper gastrointestinal contents consist of

- food compounds
- complex lipids/micellar/aqueous/hydrocolloid and hydrophobic phases
- hydrophilic phases
- solid, liquid, colloidal and gas bubble phases.[2]

Micelles are colloid-sized clusters of molecules which form in conditions as those above, similar to the critical micelle concentration of detergents.[3] In the upper gastrointestinal tract, these detergents consist of bile acids and di- and monoacyl glycerols which solubilize triacylglycerol's and cholesterol.[3]

Two mechanisms bring nutrients into contact with the epithelium:

1. intestinal contractions create turbulence; and
2. Convection currents direct contents from the lumen to the epithelial surface.[1]

The multiple physical phases in the intestinal tract slow the rate of absorption compared to that of the suspension solvent alone.

1. Nutrients diffuse through the thin, relatively unstirred layer of fluid adjacent to the epithelium.

2. Immobilizing of nutrients and other chemicals within complex polysaccharide molecules affects their release and subsequent absorption from the small intestine, an effect influential on theglycemic index.[1]

3. Molecules begin to interact as their concentration increases. During absorption, water must be absorbed at a rate commensurate with the absorption of solutes. The transport of actively and passively absorbed nutrients across epithelium is affected by the unstirred water layer covering the microvillus membrane.[1]

4. The presence of mucus or fiber, e.g., pectin or guar, in the unstirred layer may alter the viscosity and solute diffusion coefficient.[2]

Adding viscous polysaccharides to carbohydrate meals can reduce post-prandial blood glucose concentrations. Wheat and maize but not oats modify glucose absorption, the rate being dependent upon the particle size. The reduction in absorption rate with guar gum may be due to the increased resistance by viscous solutions to the convective flows created by intestinal contractions. Dietary fiber interacts with pancreatic and enteric enzymes and their substrates. Human pancreatic enzyme activity is reduced when incubated with most fiber sources. Fiber may affect amylase activity and hence the rate of hydrolysis of starch. The more viscous polysaccharides extend the mouth-to-cecum transit time; guar, tragacanth and pectin being slower than wheat bran.[4]

Fiber in the colon

The colon may be regarded as two organs,

1. The right side a fermenter,[5] The right side of the colon is involved in nutrient salvage so that dietary fiber, resistant starch, fat and protein are utilised by bacteria and the end-products absorbed for use by the body

2. The left side affecting continence.

The presence of bacteria in the colon produces an ‘organ’ of intense, mainly reductive, metabolic activity, whereas the liver is oxidative. The substrates utilized by the cecal have either passed along the entire intestine or are biliary excretion products. The effects of dietary fiber in the colon are on

1. bacterial fermentation of some dietary fibers

2. thereby an increase in bacterial mass

3. an increase in bacterial enzyme activity

4. changes in the water-holding capacity of the fiber residue after fermentation

Enlargement of the cecum is a common finding when some dietary fibers are fed and this is now believed to be normal physiological adjustment. Such an increase may be due to a number of factors, prolonged cecal residence of the fiber, increased bacterial mass, or increased bacterial end-products. Some non-absorbed carbohydrates, e.g. pectin, gum arabic, oligosaccharides and resistant starch, are fermented to short-chain fatty acids (chiefly acetic, propionic and n-butyric), and carbon dioxide, hydrogen and methane. The cecal fermentation of 40–50 g of complex polysaccharides will yield 400–500 mmol total short-chain fatty acids, 240–300 mmol acetate, and 80–100 mmol of both propionate and butyrate. Almost all of these short-chain fatty acids will be absorbed from the colon. This means that fecal short-chain fatty acid estimations do not reflect caecal and colonic fermentation, only the efficiency of absorption, the ability of the fiber residue to sequestrate short-chain fatty acids, and the continued fermentation of fiber around the colon, which presumably will continue until the substrate is exhausted. The production of short-chain fatty acids has several possible actions on the gut mucosa. All of the short-chain fatty acids are readily absorbed by the colonic mucosa, but only acetic acid reaches the systemic circulation in appreciable amounts. Butyric acid appears to be used as a fuel by the colonic mucosa as the preferred energy source for colonic cells.

Research has shown that fiber may benefit health in several different ways. Lignin and probably related materials that are resistant to enzymatic degradation, diminish the nutritional value of foods.[6]

Table legend

Color coding of table entries:

- Both Applies to both soluble and insoluble fiber
- Soluble Applies to soluble fiber only
- Insoluble Applies to insoluble fiber only

Effects[7][8]
Increases food volume without increasing caloric content, providing satiety which may reduce appetite.
Attracts water and forms a viscous gel during digestion, slowing the emptying of the stomach and intestinal transit, shielding carbohydrates from enzymes, and delaying absorption of glucose[9], which lowers variance in blood sugar levels
Lowers total and LDL cholesterol, which may reduce the risk of cardiovascular disease

Regulates blood sugar, which may reduce glucose and insulin levels in diabetic patients and may lower risk of diabetes[10]
Speeds the passage of foods through the digestive system, which facilitates regular defecation
Adds bulk to the stool, which alleviates constipation
Balances intestinal pH[64] and stimulates intestinal fermentation production of short-chain fatty acids, which may reduce risk of colorectal cancer[11]

Fiber does not bind to minerals and vitamins and therefore does not restrict their absorption, but rather evidence exists that fermentable fiber sources improve absorption of minerals, especially calcium.[12] Some plant foods can reduce the absorption of minerals and vitamins like calcium, zinc, vitamin C, and magnesium, but this is caused by the presence of phytate (which is also thought to have important health benefits), not by fiber.[13]

Water-holding capacity of dietary fiber

The water-holding capacity of dietary fiber has important physiological effects in both the upper and lower intestine. Hydration of fiber occurs by adsorption to the surface of the macromolecules and by entrapment within the interstices of the fibrous or gel matrix. The fiber saturation capacity or upper limit of water held is determined by the chemistry and morphology of the macromolecules and by the pH and electrolyte concentration of the surrounding medium. The initial event upon exposure of fiber to an aqueous medium is surface adsorption of water molecules. The presence of sugar residues with free polar groups confers a significant hydrophilic capacity to polysaccharides whereas intermolecular bonding, such as the ether crosslinkages between chains of cellulose molecules, has the opposite effect (14). Aqueous swelling of cellulose fibers does not alter the x-ray diffraction pattern, suggesting that water adsorption is limited to monocrystalline regions occupied by other sugars or uronic acids (14).Lignin is relatively apolar and much less hygroscopic than are other fiber components.

Particle size may also influence the water-holding capacity of fiber, since it determines the volume of the interstitial space within the fiber matrix available for water entrapment (15-17). Robertson and Eastwood (16) have demonstrated that the method of fiber preparation alters water-holding capacity profoundly although the chemical composition is unchanged. This suggests that the physical structure of fiber is the most important determinant of hydratability. Water-holding capacity has been assessed by using centrifugation to separate free or unadsorbed water from bound and interstitial water. Dependent on the fiber source, variable degrees of fibrous matrix collapse may occur [(18).] A second method involves equilibration of a fiber suspension with a solution of a “probe” substance such as dextran blue. This method assumes that the concentration in the interstitial volume is identical to the external solution; hence adsorption of the probe to fiber could yield erroneous results [(18)]. A reliable method is not yet available for the separate determination of bound and interstitial water [(16).] In the upper intestine, the water-holding capacity of fiber may affect the pattern of nutrient absorption, postprandial satiety, and intestinal motility. Viscous fibers such as guar and pectin reduce the rate of glucose absorption [(19)] presumably due to partitioning of water-soluble nutrients into the gel structure, thus reducing their rate of diffusion towards the absorptive mucosal surface. In vitro studies are, however, of limited usefulness in predicting the effect of fiber on stool bulk and water content, since fermentation by colonic bacteria profoundly alters the capacity of the fiber for water adsorption [(20).]

INDICATIONS & USES:

FIBRALTAR contains Galactomannans which in turn having high amounts of soluble fiber content. Our FIBRALTAR can act in conditions like Diabetes, Hypercholesterolemia, Obesity, Hypertriglyceridemia, Gall Stones, and in Irritable Bowel Syndrome.

The role of galactomannans in enteral nutrition, weight loss and cancer chemoprevention has also been discussed. The dietary significance of the gums is associated to their effects at various sites in the gastrointestinal tract from the stomach to the large intestine. Most of their actions in the upper gut have been related to their ability to produce high viscosity (at low concentration) in the gut lumen, thereby significantly affecting the nutrient absorption and postprandial plasma nutrient levels. The other beneficial effects are related to the fermentation of gums by microflora in the large intestine (Edwards, 2003).

1) DIABETES:

All sugar, natural or refined, ends up as glucose in our blood stream. Glucose is the major carbohydrate used as fuel in our body to provide energy. In the fasting state, as in the morning before breakfast, the blood glucose level is between 80 mg and 90 mg/dL (dL= deciliter, equals one tenth of a liter) of blood in healthy people.

After a meal containing carbohydrates the blood glucose rises to a level of 120 mg to 140 mg after one and half to two hours, and then gradually falls to normal level in approximately four hours.

In diabetes, the blood sugar may reach 180 mg and higher after a meal containing carbohydrates. This high level of blood sugar is termed “hyperglycemia.” Blood sugar below 70 is termed “hypoglycemia,” which is characterized by feelings of weakness, shakiness, an unusual hunger, and a certain level of irritability.

As we grow older our glucose tolerance starts to decline, and as it continues to worsen, it increases our risk for diabetes. Diabetes is a metabolic disorder in which the body cannot control the level of sugar in the blood.

Diabetes is one of the most costly and burdensome chronic diseases of our time and is a condition that is increasing in epidemic proportions in the U.S. and throughout the world. Diabetes affects 16 million Americans, and more than 125 million people worldwide. Diabetes is the fourth-leading cause of death by disease in the U.S. About two-thirds of the nearly 16 million people with type II diabetes in the U.S. are overweight, according to the American Diabetes Association. The pancreas in diabetic people produces little or no insulin, the hormone responsible for facilitating uptake of glucose by cells to produce energy.

There are two main types of diabetes: adult-onset diabetes, also called Type II or non-insulin-dependent diabetes mellitus (NIDDM); and childhood-onset diabetes, also called Type I, or insulin-dependent diabetes mellitus (IDDM).

In Type I, which accounts for 5 to 10 percent of diabetes, the pancreas cannot make the insulin needed to process glucose. Type I diabetes most often occur in children and young adults. Individuals suffering from Type I diabetes are totally insulin dependent. Without regular injections of insulin the sufferer lapses into a coma and dies.

Type II diabetes, the most prevalent type of diabetes, accounts for 90 to 95 percent of diabetes, is usually of gradual onset and progresses slowly, and occurs mainly in people over 40. Type II diabetes is a metabolic disorder resulting from the body's inability to make enough, or properly use, insulin to meet the body's needs. Type II diabetes is nearing epidemic proportions due to a greater prevalence of obesity.

Diabetics suffer from significantly higher rates of kidney disease, stroke, eye ailments, neuropathy, and poor circulation requiring amputation of limbs. Heart attacks account for 60% and strokes for 25% of deaths in all diabetics. Neuropathy is characterized by a distorted nerve function, particularly in the nerves responsible for sensation.

Diabetes may be controlled with insulin, medications, and in some cases through careful diet. Weight loss is considered the cornerstone of treatment in people with Type II diabetes because it allows the body to better use insulin and thus lowers blood sugar.

Researchers at Harvard found that more than 90 percent of the 3,300 women who developed diabetes over a 16-year study period were overweight, inactive, and smokers. The study suggests that most of diabetes can be prevented through diet and exercise. Maintaining a healthy weight is the most important way to reduce risk of Type II diabetes.

Herbs, such as fenugreek with purported anti-diabetic activity have been used in folk medicine for many years.

Diabetic patients should consume food with a low glycemic index because rapid increases in blood glucose exacerbate overproduction of insulin by the pancreas and insulin resistance. Since they both affect the rapidity with which blood glucose rises after a meal, soluble fiber and foods with a low glycemic index confer similar benefits.

During digestion, wave-like currents caused by contractions of the intestinal muscles bring nutrients to the surface of the intestinal wall for absorption. After soluble fiber dissolves in water, however, it traps nutrients inside its gummy gel and slows down considerably while moving through the digestive tract. Inside the gel, nutrients are shielded from digestive enzymes and less likely to reach the wall of the intestines. Dietary sugars like carbohydrates and starch are among the nutrients trapped inside this gel. Consequently, sugar is absorbed into the bloodstream more slowly, blunting the sharp spike in blood glucose typically experienced by diabetic patients after a meal. Fewer spikes in blood glucose lead to greater sensitivity to the action of insulin. Avoiding high peaks and low valleys in blood glucose places less stress on the pancreas and is important not only to diabetics but also to those who want to prevent the development of type 2 diabetes.

Scientists propose one other explanation for soluble fiber's effect on blood glucose. In order for nutrients to be absorbed into the intestines, they must first cross an unstirred water layer covering the surface of the intestines. Soluble fiber thickens this layer, making it more resistant to the movement of nutrients diffusing into the body. Both theories attempt to explain why blood glucose levels rise more slowly when consumed with soluble fiber.

Mechanism of blood sugar lowering action of FIBRALTAR:

A high-fiber diet is associated with the improved ability to handle blood sugar. In the presence of a high fiber diet, the cells are more sensitive to insulin and an increase in the number of insulin receptor sites occurs or alternatively, there is a stimulation of the cell's ability to burn glucose. Certain dietary fibers reduce the rate of food passage through the intestine and into the bloodstream, thereby helping to control the increase in postprandial blood sugar levels. High-fiber diets are associated with less glycosuria (sugar in urine), lower fasting blood sugar levels, and lower insulin requirements. Water-retaining fibers, especially the mucilaginous compounds, such as the gel fiber present in Galactomannans, reduce the rate of glucose absorption and may also delay gastric emptying thereby preventing the rise in blood sugar levels following a meal. In addition to its hypoglycemic effects, the hypolipidemiceffect of FIBRALTAR have also been documented. Therefore, Fenugreek fibers have a dual role to play in the management of diabetes.

The gel fiber fractions of Galactomannans are thought to be responsible for the hyoglycemic effect. In animal studies, Galactomannanshas been shown to delay the rate of gastric emptying and slow carbohydrate absorption. Based on the results of clinical studies, Sharma (1986) proposed that Galactomannansenriched diets cause a delay in the absorption of carbohydrate from the diet, thereby reducing insulin requirements. FIBRALTAR affects blood glucose by reducing glucose uptake from the intestine. The delay in gastric emptying and carbohydrate absorption may be attributed to the gel fraction which increases the viscosity of the digesta.

It was speculated that the reduction in insulin requirement seen in some of the Type II diabetic patients may be due to the Fenugreek fibers improving peripheral insulin sensitivity. Frequently, in Type II patients, insulin secretion is normal or even higher than normal but the reduced number of insulin receptor sites on body cell membranes in these patients' leads to insensitivity to insulin, i.e., the cells do not respond to insulin. It has been shown in the past that in the presence of a high fiber diet, an increase in the number of insulin receptor sites occurs and the cells become more sensitive to the action of insulin.

In the clinical studies, a reduction in urinary excretion of glucose was also observed, indicating greater retention of dietary carbohydrate in the body. As carbohydrate-rich diets are known to improve glucose tolerance, increased carbohydrate retention may be beneficial to diabetics (Sharma et al., 1990). Clinical studies also indicate that diabetics become sensitive to insulin after adaptation to high fiber diets (Reiser, 1979).

2) OBESITY:

Obesity is a risk factor for morbidity and mortality from cardiovascular, musculoskeletal, malignant and metabolic diseases,as well as considerable social and financial burdens. Poor compliance with behavior-modifying management programs and frequent weight regain after the cessation of most medical therapies has led to the use of alternative, conservative approaches based on dietary fiber (DF) before considering bariatric surgery.

The potential beneficial effects attributed to DF were based on earlier epidemiological, indirect evidence, claims of efficacy in a predominantly over-the-counter, unregulated domain, and the public's perception that if a product is natural, it is safe and efficacious. The scientific literature documents several favorable effects of DF on glucose homeostasis, lipid metabolism and calorie intake. The gastrointestinal tract plays a role in these functions. The stomach signals satiation in response to a meal and affects the rate of delivery of macronutrients to the small intestine, which is the site for most nutrient and energy absorption. Gastric and small intestinal functions are integrated with glucose-regulatory mechanisms originating in the pancreas (e.g. insulin) and the small intestine [specifically incretins, glucose-stimulated insulinotropic peptide [GIP], and glucagon-like peptide 1 [GLP-1].

Epidemiological studies suggest an inverse relation of DF intake and body weight, and this is supported by cross-sectional studies (with body mass index or body fat mass), and large observational studies (body weight gain in women and in men). Body weight gain was inversely correlated with the amount of whole-grain ingestedin the large-scale study on Coronary Artery Risk Development in Young Adults (CARDIA).

Mechanisms for the Effect of Dietary Fiber on Weight Reduction

Body weight and fat-mass regulation result from a complex interplay of multiple factors, involving central nervous circuits, peripheral sensation stimuli, mechanical and chemical satiation signals arising in the gastrointestinal tract, afferent vagal input, and adiposity signals from fat tissue and liver.[21] The stomach signals satiation in response to volume and calories of the ingested meal;[22] a lower postprandial volume predicted an increased satiation score and a decreased maximum tolerated volume of a challenge meal test.[23] In many studies, DF induced greater satiety compared with digestible polysaccharides and simple sugars.[24, 25] Greater satiety may result from several factors: the intrinsic physical properties of DF (bulking, gel formation and viscosity change of gastric contents),[26] modulation of gastric motor function and blunting of postprandial glucose and insulin responses. Postulated effects on gut peptide hormones involved in signaling satiation [such as ghrelin, glucagon-like peptide-1 (GLP-1), cholecystokinin, peptide YY (PYY) or glucose-dependent insulinotropic peptide (GIP)] remain incompletely resolved.[26, 27-39]

DF may also prolong meal duration and result in increased mastication with possible cephalic and peripheral influences on satiety.[38] DF-containing meals have a lower energy density and may affect palatability of food, possibly reducing energy intake.[39]

3) Hypercholesterolemia:

Evidence suggests that soluble fiber is more effective at lowering cholesterol, but both types of fiber are important for your health. One of the ways soluble fiber may lower blood cholesterol is through its ability to reduce the amount of bile reabsorbed in the intestines. It works like this: When fiber interferes with absorption of bile in the intestines, the bile is excreted in the feces. To make up for this loss of bile, the liver makes more bile salts. The body uses cholesterol to make bile salts. So in order to obtain the cholesterol necessary to make more bile salts, the liver increases its production of LDL receptors.

These receptors are responsible for pulling cholesterol out of LDL molecules in the bloodstream. Therefore, the more bile salts are made from the liver, the more LDL cholesterol is pulled from the blood. There is more to be learned about the relationship between soluble fiber and cholesterol, however. It is also possible that one of the short-chain fatty acids produced by the fermentation of soluble fiber in the large intestines may inhibit the amount of cholesterol produced by the liver.

Research has shown that increasing soluble fiber by 5 to 10 g a day reduces LDL cholesterol by about five percent. Oat bran and oatmeal, as well as psyllium and barley, are rich in beta-glucan, a soluble form of fiber, which has been shown to lower total cholesterol and LDL cholesterol.

Evidence suggests that more than 11 g of beta-glucan from oats can lower cholesterol up to 14.5 percent. (In one study, 3 g of beta-glucan was equivalent to about 2.5 ounces of oat bran.) In fact, according to the Food and Drug Administration (FDA), foods such as whole oats and barley that contain at least 0.75 g of beta-glucan soluble fiber per serving can state on their label that they may reduce the risk of heart disease, along with a diet low in saturated fat and cholesterol.

The National Cholesterol Education Program (NCEP) suggests that people adhering to the therapeutic lifestyle changes (TLC) program -- a diet and exercise program designed to lower cholesterol -- get at least 5 to 10 g of soluble fiber a day, but 10 to 25 g of soluble fiber is recommended to lower LDL cholesterol even more.

The National Academy of Sciences recommends that men and women get even more fiber: up to age 50, men should get 38 g and women 25 g of total fiber -- meaning insoluble and soluble fiber -- each day, and men age 50 and older should get 30 g and women 21 g each day. However, Americans are only getting about 15 g of fiber each day. Diets rich in fat, such as the typical American diet, are generally low in fiber because the most common sources of dietary fat -- foods of animal origin or commercially prepared baked goods -- contribute little or no fiber to the diet.

Hypocholesterolemic effect of fenugreek fiber:

It has been shown that the gel fraction of fenugreek fiber, contains galactomannans which increase the viscosity of the digesta thereby reducing serum cholesterol levels. This is achieved through the inhibition of cholesterol absorption from the small intestine and also the inhibition of bile acid reabsorption from the terminal ileum. If bile acids are excreted, the balance tilts towards their synthesis in the liver from cholesterol, thereby lowering serum cholesterol levels (Gee, et al. (1983). Other studies have shown that galactomannans influence gastrointestinal hormone secretions, thereby increasing the activity of a number of key enzymes in carbohydrate and lipid metabolism.

In addition to its high fiber content, Fenufiber also contains a biologically significant level of saponins. Saponins are known to have hypocholesterolemic effects. When saponins are ingested in isolated or food borne forms, they form large mixed micelles with bile salts and significantly reduce serum cholesterol, by increasing fecal excretion of bile salts, thereby inhibiting cholesterol absorption.

Studies of fenugreek (Trigonella foenum-graecum) have shown that it may also have hypocholesterolemic activity. Subjects with elevated blood cholesterol concentrations who consumed powdered fenugreek seeds experienced a significant reduction in LDL-cholesterol and triacylglycerol concentrations without any change in HDL-cholesterol concentrations. Asian ginseng (Panax ginseng) is another medicinal plant with a long history of use. Researchers have discovered a nonsaponin fraction in ginseng root that inhibits platelet aggregation by potently inhibiting thromboxane A_2 production.

4) Diabetic Hypertriglyceridemia:

Effects fenugreek on blood lipids decreasing:

According report, supplementation of these medicinal plants mixture (fenugreek), decreased in serum triglycerides, total cholesterol, LDL-C,VLDL-C in both raw and cooked form but increased in HDL-C with the increase in supplementation of medicinal plants. Studies reported that diabetic state, resulting from an impaired secretion and sensitivity of insulin may be responsible for high triglycerides level in serum than normal individuals, as the insulin stimulated the synthesis of adipose tissue by agency of lipoprotein lipase. Similar decrease in triglycerides and total cholesterol level of the diabetics were observed by feeding fenugreek seeds by various workers. Because fenugreek is contain fibre and fiber have effect of dietary fiber on lipoprotein cholesterol is due to its association with absorption and transport of lipids. Too, according reports, Fenugreek seeds also lower serum triglycerides, total cholesterol (TC), and low-density lipoprotein cholesterol (LDL-C). These effects may be due to sapogenins, which increase biliary cholesterol excretion, in turn leading to lowered serum cholesterol levels. The lipid-lowering effect of fenugreek might also be attributed to its estrogenic constituent, indirectly increasing thyroid hormone. The quality and quantity of protein in the diets have a direct effect on the levels of cholesterol. Generally plant protein appears to lower cholesterol level. The plant protein in fenugreek is 26%, so it might exert a lipid lowering effect. A study on the extent of degradation of the saponin and/or diosgenin another steroid saponins in the alimentary tract of alloxan diabetic dogs suggested that steroid saponin and sapogenin might have a role in lowering cholesterol. The lipid-lowering potential of diosgenin has been demonstrated by several experimental studies. Diosgenin decreased the elevated cholesterol in serum LDL and HDL fractions in cholesterol-fed rats, and had no effect on serum cholesterol in normo cholesterolemic rats. In addition, diosgenin inhibited cholesterol absorption, and suppressed its uptake in serum and liver, and its accumulation in the liver. Galactomannan influences intestine walls to generate hormones and enzymes and they influence biosynthesis of cholesterol in liver.

5) Gall Stones:

Fenugreek contains saponins and galactomannan fiber that boost bile release in the gallbladder, and suppress cholesterol absorption and glucose processing in the gastrointestinal tract. The soluble gel fraction of fenugreek seeds constituted the major portion of the seed coat (including the endosperm) polysaccharides, most of which consisted of galactomannan with mannose:galactose ratio of 1:1. The relatively small amount of the insoluble cell wall included mainly cellulose (as glucose) and pectin (as galacturoinic acid). In vivo nutrition experiments in rats and in vitro studies using inverted gut showed that the gel fraction decreased both digestion and absorption of starch and uptake of bile acid (taurocholate and deoxycholate).

6) Irritable Bowel Syndrome:

Apart from the soluble fibre in the FIBRALTAR, Insoluble fibre

7) Constipation:

Soluble fiber also prevents constipation, because the colon becomes filled with gel, as opposed to being clenched tightly around dry, hard stools. Basically, fiber moves bulk through the intestines and helps to balance the pH (acidity) level in the intestines. It is also helps to keep healthy the good bacteria that live in your digestive tract.

CONTRAINDICATIONS:

1) Pregnancy and Fenugreek

Pregnant women should avoid fenugreek due to its oxytocic affects. It has been shown to cause premature deliveries by stimulating uterine contractions. It is also said to promote breast milk production in women. Infants who consume the breast milk of a woman, who is taking fenugreek, may have urine that smells like maple syrup. It is highly recommended that women, who are breastfeeding, are currently pregnant, or attempting to become pregnant contact their physician before taking fenugreek.

2) Hypersensitivity or history of allergic reaction to Fenugreek or any of its components.

CLINICAL TRAILS:

ANIMAL TRIALS

Diabetes mellitus represents a serious health problem in many developing countries, with the World Health Organization estimating that over 300 million people will soon be affected by the year 2025. Current pharmalogical agents, including synthetic disaccharidase and lipase inhibitors, act on delaying the dietary absorption of glucose and lipid, thereby decreasing the postprandial hyperglycaemia and hyperlipidemia effects.

However, gastrointestinal discomforts such as flatulence, diarrhea, and abdominal pain are commonly experienced by diabetic patients who are on these agents. Consequently, there is a particular interest aims in search of dietary polysaccharides as an alternative therapy to reduce intestinal glucose and lipid uptakes with minimal side-effects. Galactomannan, a highly branched water-soluble polysaccharide consisting of a mannose backbone with galactose side chains, is one of the major components present in fenugreek seeds.

Due to its hydrophilic nature, hydrogen bonds are formed between galactose and water, generating a viscous solution. Using a streptozotocin-induced diabetic rat model, Hamden et al. discovered that after a 2-week administration of galactomannan crude extract, enzymatic activities were significantly decreased in all 30 of the diabetic rats. Since these enzymes are responsible for the conversion of oligosaccharides into monosaccharides in the intestine, thus the inhibitory effects exerted by galactomannan seemed to have carried over to the hydrolysis and absorption of carbohydrate as well. Further investigation revealed that the administration substantially reverted their intestinal lipase activity from 164% to 46%. Likewise, their plasma LDL-cholesterol and triglycerides (TG) concentrations were significantly reduced, while an increase in plasma HDL-cholesterol concentration was observed instead.

The findings of this in vivo study have proven the hypoglycaemic and hypolipidemic efficacy of fenugreek galactomannan in diabetes condition, thereby demonstrating itself as a potential candidate for future anti-diabetic drug development. Their results corroborate with a recent in vitro study conducted by Srichamroen et al. where they took segments of jejunum and ileum from genetically determined lean and obese rats and incubated with 2 – 32 mmol/L of glucose in the presence of 0.1% to 0.5% galactomannan. The rate of intestinal glucose uptake in both segments was negatively and linearly correlated with galactomannan concentrations. In other words, the gel-forming characteristic of galactomannan increases the resistance and viscosity of the unstirred water layer along the mucosal membrane, thereby acting as a significant physical barrier to glucose diffusion by conglomeration.

Many Trigonella plant species contain a structurally unique amino acid, 4-hydroxyisoleucine (4-OH-Ile), not found in mammalian tissues. This amino acid exists as two diastereoisomers in fenugreek seeds. Recently, Broca et al. discovered that the major isomer exerted insulinotropic activity in vitro in the presence of abnormally high glucose levels (6.6 – 16.7 mmol/L) by directly stimulating insulin release from rat and human b-cells in pancreatic islets of Langerhans. They then examined the insulinotropic effect of 4-OH-Ile in two species (rat and dog) using different routes of administration, and subsequently assessed by intravenous (IVGTT) and oral glucose tolerance tests (OGTT). During IVGTT in normal rats or OGTT in normal dogs, 4-OH-Ile improved glucose tolerance. A six-day subchronic administration of 4-OH-Ile reduced basal hyperglycemia, insulinemia, and improved glucose tolerance as seen in the diabetic rats. In any case, this indicates that 4-OH-Ile sensitizes the insulin secretion from the b-cells in response to the peripheral levels of glucose, not in an independent manner.

HUMAN TRIALS

1) Diabetes:

The anti-diabetic properties of fenugreek were positively confirmed in several studies involving human subjects. In a randomized, controlled, crossover trial conducted by Sharma et al., 10 participants with Type I diabetes mellitus were asked to consume a daily quantity of 100 g of fenugreek seed powder (dosage was divided into lunch and dinner) or a placebo for 10 days. By the end of the study, a significant improvement was noted in the fenugreek group in several parameters: a 54% reduction in 24-hour urine glucose levels and mean reductions in glucose tolerance test values and fasting serum-glucose levels. This study suggests fenugreek facilitates insulin secretion, as suggested by animal studies, since typically these patients have little or no endogenous insulin production.

Furthermore, in a similar study where 10 non-obese, asymptomatic, hyperlipidemic adults were asked to ingest 100 g of defatted fenugreek seed powder or placebo for 20 days, Sharma et al. reported that eight (6 men and 2 women) out of ten subjects showed more than a 25% reduction in serum total cholesterol (TC), along with a major decrease in LDL and VLDL cholesterol, and triglyceride (TG) levels compared to baseline values, but the levels of HDL-C remained unchanged.

The ability of fenugreek to selectively reduce LDL and VLDL components of total cholesterol indicates their potential benefits for atherosclerosis. In a more comprehensive study, the group extended their experiment up to 25 weeks. They showed that mean TG, TC, and LDL-C levels were decreased by 14-16% during the study period, including an increase in mean HDL-C levels by 10% despite a smaller quantity was supplemented to the diet of 60 patients with type II diabetes. In other words, fenugreek exhibits tremendous benefits if given for a longer period.

2) Gall stones:

Formation of cholesterol gallstones in gallbladder is controlled by procrystallizing and anti-crystallizing factors present in bile. Dietary fenugreek seed has been recently observed to possess anti-lithogenic potential in experimental mice. In the current animal study, we evaluated the effect of dietary fenugreek on the compositional changes in the bile, particularly its effect on glycoproteins, low-molecular-weight (LMW) and high-molecular-weight (HMW) proteins, cholesterol nucleation time and cholesterol crystal growth. Groups of Wistar rats were fed for 10 weeks with diets: basal control (C), (2) C + fenugreek (12%), (3) high cholesterol diet (HCD) and (4) HCD + fenugreek (12%). Feeding of HCD containing 0.5% cholesterol for 10 weeks rendered the bile lithogenic. Incorporation of fenugreek into HCD decreased the cholesterol content (70.5%), total protein (58.3%), glycoprotein (27.5%), lipid peroxides (13.6%) and cholesterol saturation index (from 1.98 to 0.75) in bile, increased the bile flow rate (19.5%), prolonged the cholesterol nucleation time and reduced the vesicular form of cholesterol (65%), which was accompanied with an increase in smaller vesicular form (94%). There was an increase in biliary phospholipid (33%) and total bile acid (49%) contents in the HCD + fenugreek group as compared with the HCD group. Electrophoretic separation of biliary LMW proteins showed the presence of a high concentration of 28-kDa protein, which might be responsible for the prolongation of cholesterol nucleation time in the fenugreek-fed groups. These findings indicate that the beneficial anti-lithogenic effect of dietary fenugreek, which primarily is due to reduction in the cholesterol content in bile, was additionally affected through a modulation of the nucleating and anti-nucleating proteins, which, in turn, affect cholesterol crystallization.

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