

MAINTAINING REGULARITY: CONSTIPATION, FIBER AND NATURAL LAXATIVES

“The civilized colon is a poor cripple, maimed, misshapen, overstretched in parts, contracted in other parts, prolapsed, adherent, “kinked”, infected, paralyzed, inefficient, incompetent. It is the worst abused and the most variously damaged of any organ of the body.. The civilized colon... is a Golgotha of pollution, a veritable Pandora’s box of disease.”

John Harvey Kellogg, 1918 (1)

Perhaps before any other disease was labeled as being the result of civilization, constipation and its presumed consequences were bill boarded as the quintessential disease of civilized, urbanized, and sedentary men... and women. Many considered it to be the root of all diseases, and treatment options have been varied and numerous. In this review, we hope to show the relationship between constipation and other conditions with which it is related, either as a consequence or causative factor. We will focus primarily on the various natural ingredients that have been used to treat constipation and the additional benefits of dietary fiber.

Perhaps defining constipation is nearly as difficult as defining “normal” stool frequency. Disagreement on what constitutes “normal” is well established when asking various health care providers and even more varied when asking patients. Most would agree that stool frequency less than 3 times per week would define constipation, although many would say that less than once per day may constitute constipation. In addition to frequency, difficult evacuation of hard, dry stools may constitute the diagnosis of constipation. Regardless of how constipation is defined, we should remember that constipation is a symptom, not a disease. The underlying causes of constipation may be quite varied and therefore treatment protocols vary as well. Causes may include endocrine disorders such as diabetes and hypothyroidism, neurological diseases such as MS, Parkinson’s or spinal cord injuries, or diseases within the colon/anal area like anal fissures or inflammatory bowel disease. Many drug and surgery interventions will also lead

to symptoms of constipation. The primary cause, however, is the diet and lifestyle factors that are common in the American culture.

Maintaining regularity is almost a non-issue for those without constipation, but for those who suffer from it (or think they do) it is an all consuming passion. Historically, constipation has always been high on the list of symptoms which patients self diagnose and self treat. Over-the-counter (OTC) remedies have been sold and marketed as long as anyone can remember. In fact, the concern over constipation may have been the greatest impetus for the breakfast cereal industry in the early 1900’s.

Constipation Research

Because of the issue of definition, it has always been difficult to study constipation in the general population. What we have learned is that women, especially petite women within child-bearing age, seem to be the

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IN MY OPINION

Does Ginkgo really enhance memory... I forget. Or apparently that is what the authors of a recent JAMA article (1) would like us to do with all the positive research that has been published about Ginkgo biloba extracts for the past several decades. This is classic sound-bite research—intended to generate media sound-bites while adding nothing important to the scientific body of research. This is the sort of “research” that has recently been published on St. John’s wort and now its ginkgo’s turn. Let’s see what they really discovered.

The author’s readily admit that their design was not to evaluate whether ginkgo had an effect on memory enhancement, but to evaluate the claims of a popular ginkgo product marketed to enhance memory and claiming to have benefits in as little as four weeks. In essence, this study was designed to challenge what the author’s presumed would be a claim they could “prove” false. Even though almost all the well performed clinical trials were long-term and typically involved patients with dementia or reported memory decline, these authors chose healthy patients for a 6-week trial. What they found was not surprising- no significant benefit in the parameters measured. While this kind of research was insignificant at best, it was able to make the prestigious pages of JAMA and was even included as a free downloadable article on the JAMA website. Why? Because the editors of JAMA know that most people wouldn’t read the study and compare it to previous research—they will only hear the sound-bites: “Ginkgo study shows no benefit”, “JAMA study says Ginkgo ineffective” etc.

One of the most conservative reviewing systems of medical data, The Cochrane Database Reviews, has a different conclusion about the research published on ginkgo. They have just concluded that the research, as a whole, is very promising in the area of cognition and function in patients taking ginkgo (2). Few of you likely heard about this report, nor how difficult it is to get positive outcomes from these rigorous meta-analysis reports. It is difficult to explain the continued negative reports from such journals as JAMA, NEJM and many others except to conclude that bias is involved at the editorial, research, and funding levels. While this comes as no surprise to most of you, it is continually frustrating to see such willing accomplices in the media outlets that influence most of your patients.

It is our hope that one day such gross bias will be gone in funded research and editorial positions and we will be able to evaluate non-pharmaceuticals on an equal playing field with their FDA-protected alternatives. In that day we may be able to forgive such bias, however those of us taking ginkgo are unlikely to forget.

1. Solomon PR, Adams F, Silver A, Zimmer J, DeVaux R. Ginkgo for memory enhancement: a randomized controlled trial. *JAMA*. 2002;288:835-840.

2. Birks J, Grimley EV, Van Dongen M. Ginkgo biloba for cognitive impairment and dementia. *Cochrane Database Syst Rev*. 2002;(4):CD003120. Review.

population most afflicted with constipation (2). One way to get general information may be through laxative use. However estimates of laxative use (which have been estimated at 10% of the U.S. population) may not be an adequate way to assess populations as patients concerned about constipation are prone to underestimate bowel frequency and overuse laxatives (3). This is why physicians need to take an extensive patient history when assessing the patient’s bowel issues. Questions should include what they consider “normal”, how long they have been constipated, and what remedies have they tried and when. A stool diary which includes time, difficulty in passing, general appearance and size of stool should be considered along with a food and water diary.

Connecting constipation with lifestyle factors has been problematic, at least in the published research. While constipation has been shown to be related to inactivity, no conclusive evidence exists for a positive effect of physical exercise as a treatment option for chronic constipation (4, 5). In one recent study from Japan, exercise (walking), as well as dietary fiber intake (from rice), were significant in reducing the risk of constipation (6). Allergy/intolerance to cow’s milk protein has been shown to be linked to chronic constipation in some children (7). The role diet plays in constipation is covered in the Diet and Lifestyle section below.

Constipation as a risk factor

It is always difficult to make epidemiological connections with something as general as constipation, but several promising connections have been made. It is known that bowel transit time effects the microbial environment of the colon. The colon is populated by numerous beneficial microorganisms which help digestion and protect against disease (For a review see *The Standard* Vol. 2 No. 2). When bowel transit time is increased or decreased experimentally in subjects with constant diet, dramatic changes in overall stool weight and character are observed, along with dramatic changes in microbial mass. Slowing bowel transit time decreases the numbers of helpful microbial organisms in the bowel, and this may increase susceptibility to disease (8). This was shown to be the case in Japanese children during a outbreak of *Escherichia coli* 0157 in 1996. Those children with fewer bowel movements were much more likely to have severe symptoms to the E.coli, than those children with bowel movements on a daily basis (9). These data suggest that the addition of probiotic therapy for patients experiencing constipation will likely prove beneficial.

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Slow bowel transit time is also associated with increased deoxycholic acid (DCA) in the bile, which increases the risk of gallstone formation (10). Measuring biliary DCA, as well as laxative use, is predictive for recurrence of gallstone formation (11). Likewise, in some studies, dietary fiber is protective against gallstone formation (11, 12 -in animal model). Constipation also is strongly associated with gallbladder and bile duct cancers (13), especially in cases of previous gallbladder problems. Chronic constipation (linked to lower fiber intake) is also statistically related to increased risk of appendicitis in children (14).

Previously it was noted that patients with Parkinson's disease (PD) often have associated constipation. In a very interesting epidemiological study it was discovered that constipation may actually be part of early PD processes, a marker of susceptibility or an environmental factor that may cause PD (15). A follow-up of 6,790 men in the Honolulu Heart Program during a 24 year period revealed that men with less than one bowel movement per day were 2.7 times more likely to have PD than those with at least 1/day. And the risk was 4.5 times higher than men with more than two bowel movements per day.

The role of constipation, laxative use, or both, has been controversial in the increased risk of colorectal cancer. Epidemiological studies have shown a relationship between repeated bouts of constipation and colon cancer (16, 17). Laxative use is associated with the constipation, but usually not implicated as causative. The relationship is likely related to decreased levels of beneficial microorganisms, stress on the colon wall and a diet that promotes both cancer and constipation (18). A diet high in protective phytonutrients is usually also accompanied with adequate dietary fiber to promote bowel regularity. Conversely, diets high in cooked fat and meats, with little fruits and vegetables, provides little fiber and are laden with cancer promoting hydrocarbons (19).

Of course for many, the largest issue concerning constipation is what is referred to as auto-intoxication, or systemic toxemia. Generally this is defined as a prolongation of toxins in the colon, allowing ample time for them to enter back into the blood stream and stress the liver as well as other organ systems, and lead to disease. This, many say, is the real potential danger of slow bowel transit times. This is not a trivial subject because, in one sense, this was the impetus for the beginning of the discipline of naturopathic medicine. This subject, however, is much too large and complex to be covered in this review and the reader is directed to the texts in the "General" section of the references.

Diet and Lifestyle are key

While there are many therapies one could use, we will deal primarily with those related to diet and dietary supplements. It is important to note that the general

information here is largely for idiopathic (primarily lifestyle induced) constipation caused by lack of "tone" (atonic). These recommendations are not for the less common spastic constipation, which will not be covered in this review.

The Western Diet

"One of the gravest defects of the civilized diet is its lack of raw foods and ballast, or roughage. We eat over-milled cereals, chemicalised sugars, softly cooked vegetables, sloppy seasoned hashes, slushy puddings and soups, pappy porridges, sophisticated and highly-refined concocted dishes of all kinds. In such a diet there are no rough irritating substances to stimulate intestinal peristalsis."

George Dupain, 1934 (20)

It would be difficult to overestimate the role diet, specifically dietary fiber intake, is thought to play in the cause of constipation in Western countries. Comparing dietary fiber intake between populations has often correlated positively with stool frequency and weight and inversely with colon diseases including cancer. Likewise, the increase in refinement of sugars and carbohydrates is linked with slowing bowel transit times and altering the environment of the colon (21). Perhaps the poster child for the movement against refined foods and their lack of health benefits was, and maybe still is, white bread. As Arbuthnot Lane had said on one occasion "the whiter your bread, the sooner you're dead". White bread, it has been said, embodies the very misuse of the technologies available to us, which allowed us to easily remove health benefits from the "staff of life" for the sake of convenience and profit.

Fiber- An essential component

Just like vitamins and minerals, dietary fiber has a daily recommended value (DRV). The current DRV for dietary fiber is 25 grams per day, but many believe this is much too low to maintain optimal health and should be closer to 40 or even 50 grams per day. But even at these lower levels, most Americans are not getting adequate levels of dietary fiber according to the American Dietetic Association (22). In children, recommendations are typically determined by adding 5 to the child's age to get the recommended grams per day (child age 7 = 12 grams/day). But how does one define dietary fiber.

Dietary fiber can be technically described as all plant non-starch polysaccharides, with the addition of plant lignins. This includes celluloses, gums, pectins, and mucilages. Plant fiber is nearly indigestible in humans and is often referred to as "roughage". Most dietary fiber is found in fruits, vegetables, legumes and grains. Some standard foods are found in Table 1, along with their typical fiber content. As the table shows, dietary fiber can be further divided into soluble and insoluble fiber. This characteristic does not mean true solubility (in the chemical sense), but describes those fibers which are dispersible in water. The

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Table 1

Fiber Content of Selected Foods				
Food	Serving Size	Total Fiber (g)	Soluble Fiber (g)	Insoluble Fiber (g)
Dried Beans and Peas (cooked)				
Pinto beans	1/2 cup	10.3	3.9	6.4
Kidney beans	1/2 cup	8.2	3.6	4.6
Peas, cooked	1/2 cup	5.2	2.0	3.2
Lentils	1/2 cup	4.5	0.7	3.8
Blackeyed peas	1/2 cup	4.1	0.5	3.6
Split peas	1/2 cup	3.4	1.1	2.4
Fruits				
Apple, with skin	1 medium	4.2	1.6	2.6
Pear, Bartlett	1 medium	4.0	0.8	3.2
Blackberries	1/2 cup	3.7	0.7	3.0
Prunes, dried	4 prunes	3.1	1.3	1.8
Orange	1 medium	2.5	1.6	0.9
Banana	1 medium	2.3	0.7	1.6
Strawberries	3/4 cup	2.4	0.9	1.5
Grapes	1 cup	0.6	0.1	0.5
Vegetables				
Corn, cooked	1/2 cup	4.7	0.2	4.4
Brussel Sprouts, Cooked	1/2 cup	3.6	1.7	1.9
Sweet potato, peeled	1 medium	3.4	1.7	1.7
Carrot, raw	1 medium	2.6	1.1	1.5
Potato, with skin	1 medium	2.4	0.6	1.8
Beans, green, cooked	1/2 cup	2.0	0.6	1.2
Broccoli, raw	1/2 cup	1.5	0.1	1.4
Lettuce, iceberg	1 cup	1.0	0.3	0.7
Lettuce, Romaine	1 cup	0.7	0.3	0.4
Tomato	1 medium	1.3	0.3	1.0
Cauliflower, raw	1/2 cup	1.0	0.4	0.6
Celery, raw	1/2 cup	0.9	0.2	0.7
Pepper, green, raw	1/2 cup	0.9	0.3	0.6
Breads/Rice/Pasta				
Spa. pan. white wheat, cooked	1 cup	3.7	0.7	3.0
Spiral pasta, cooked	1 cup	1.3	0.2	1.1
Sourdough bread	1 slice	2.8	0.9	1.9
Whole wheat bread	1 slice	2.2	0.5	1.7
Rye bread	1 slice	1.6	0.7	0.9
White bread	1 slice	0.6	0.3	0.3
Brown rice	1/2 cup	1.8	0.2	1.6
White rice	1/2 cup	0.6	0.2	0.4
Nuts and Seeds				
Psyllium husk powder	10.2 g		7.0	
Almonds	1/4 cup	3.9	0.4	3.5
Sesame seeds	1/4 cup	3.3	0.7	2.6
Flax Seed (ground)	9 g	3.0	1.0	2.0
Popcorn	3 cups	2.8	0.8	2.0
Peanuts, dry roasted	1/4 cup	2.5	0.7	1.8
Sunflower seeds	1/4 cup	2.2	0.7	1.5
Peanut butter, chunky	2 Tbls	1.5	0.4	1.1
Walnuts	1/4 cup	1.4	0.5	0.9
Breakfast Cereal				
All-Bran with Extra Fiber	1/2 cup	15.0	1.0	14.0
Fiber One	1/2 cup	13.0	1.0	12.0
Total Raisin Bran	1 cup	6.0	0.9	5.1
Shredded Wheat, natural	1 cup	4.2	0.7	3.5
Oatmeal, cooked	1 cup	4.0	2.4	1.6
Cherries	1 cup	1.6	1.0	0.6
Corn Flakes	1 cup	0.7	0.4	0.3

Data compiled from ADA, FDA, Mayo Clinic, and USDA websites.

soluble fibers, such as pectin and gums have a very high water holding capacity and often form a gel when mixed with water. Insoluble fibers hold very little water and will usually fall to the bottom of a glass when mixed in water. Most non-isolated plant fibers (eaten as food) will be a combination of soluble and insoluble fibers. There are some exceptions, especially with some grain seeds and seed husks such as psyllium, which is very high in soluble fibers.

Water-holding capacity, however, is not the only predictor of benefits when adding fiber to the diet. Foods high in fiber are rich in other phytonutrients, some which are bound within the matrix of the fiber itself. Certain fibers are also important foods for the healthy microbial organisms in the gut and a class of these has been termed “prebiotics” for their ability to stimulate probiotic bacterial growth (Bifidobacteria especially). In fact, looking at other characteristics, such as viscosity, susceptibility to fermentation, effect on digestive enzymes, bile acid binding capacity and anion exchange capacity must be added to its water-holding capacity to fully gauge the therapeutic benefits of individual fibers. Even the shape of certain fibers is likely to be important as inert plastic in the “shape” of flakes improved bowel transit time, while plastic as small granules had no effect (23).

As we have seen, the decreased intake of fiber as a function of modern food practices is suggested by many to be the leading cause of idiopathic constipation. While this has been empirically shown in adults for more than a century, this has recently been researched specifically in children. In one study in Brazil, children with chronic constipation typically ingested 20-30% less fiber than age and gender matched controls with normal bowel habits (24). In a larger sample group of children in Greece, dietary fiber alone was independently and inversely correlated with chronic constipation, despite the child’s age or age of onset of constipation (25). Furthermore, a study done in the U.S., showed that constipated children were consuming less than one fourth of the age+5 recommended intake even though they had been instructed “to eat a high-fiber diet” (26). It seems that in children, as well as adults, increasing dietary fiber is a difficult lifestyle change that many simply decline to make. The use of dietary fiber in patients in elderly care facilities, where less individual control over diet is practiced, has also shown to decrease laxative use and increase bowel frequency (27). This has also been the case in children with severe developmental disabilities (28). Please see bulk laxative section below for more research on the use of fiber as a therapeutic agent.

The role of dietary fiber from food is vital for maintaining balanced blood sugar levels, especially in type 1 and type II diabetics. The mechanism is thought to be related with fiber’s (mostly soluble fiber) ability to slow glucose absorption from the small intestines and reduce postprandial blood glucose levels. In a study published by the New England Journal of Medicine in 2000, type II diabetic patients were placed on two different diets; each for 6 weeks (29). Each diet was identical with the exception of dietary fiber; one provided 24 grams of fiber (8 soluble, 16 insoluble) and the other provided 50 grams of fiber (25 soluble, 25 insoluble) per day. The additional fiber statistically lowered mean daily blood glucose, daily urine glucose excretion, insulin concentration, triglycerides and VLDL cholesterol. In a report comparing type I diabetic patients consuming less than 20 grams of fiber with those consuming more than 30 grams of fiber per day, a significant decrease in blood glucose, glycosylated hemoglobin, as well as number of

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hypoglycemic events was seen in patients taking more fiber (30). These data suggest that it would be wise to advise all diabetic patients as well as those with Syndrome X/metabolic syndrome, which may account for as many as 1/5 the adult U.S. population (31), to increase dietary fiber, particularly soluble fiber (32).

The role of water in constipation

It would seem obvious that if constipation is often associated with hard, dry stools, water intake would be beneficial for decreasing constipation. This is also one of the mechanisms attributed to fibers; their ability to hold water in the stool, increasing stool size, lubrication and stimulating peristaltic function. The function of water, in relation to fiber intake was studied in a group of patients experiencing chronic constipation. One hundred and seventeen patients were put on a standard diet providing 25 grams per day of dietary fiber. One half of the group was given no instructions on water consumption while the other group was instructed to drink 2 liters of mineral water per day. The second group drank, on average, double what the first group consumed (2.1 vs. 1.1 liters). In both stool frequency ($p < 0.001$) and laxative use ($p = < 0.001$) there was a statistical improvement in the group with the higher intake of water (33). One study even suggests that carbonated water alone, as opposed to tap water, may have additional benefits for relieving constipation, as well as dyspepsia and gall bladder emptying (34). In contrast to these studies, in non-constipated individuals, water seems to be important only when intake is very low, while additional water intake was not shown to statistically increase stool frequency in these subjects (35, 36). While there is controversy over the amount of water that should be suggested for optimal health, as well as multiple factors that influence hydration; it is probably safe to say that most Americans do not drink enough water.

Therapeutic Considerations

For many, the diet, water and lifestyle options do not give adequate relief to their constipation or do not fully satisfy their desire for regularity. Other natural options do exist. But before discussing those, one more comment about lifestyle factors.

Regularity, by its very definition implies a cyclical reliability. If civilized life can be accused of stripping the "regularity" from our foods, it can certainly be accused of stripping the regularity from our life. The lack of regular eating, sleeping, working, exercising and recreating is rampant in our culture. Meals are eaten in haste, and often at different times each day. Hormones that are intended to be rhythmic and regular are irregular in many due to chronic physical and emotional stress (for a complete discussion of this vital topic see *The Standard* Vol. 3 No. 1- Adrenal Stress: diagnosis and treatment). Bowel irregularity

is a symptom of a greater irregularity in many individuals. Patients should be encouraged to eat as many meals as possible sitting down in a relaxing environment with individuals that promote wellbeing rather than stress. Regular sleep patterns should be maintained as a norm, where this is possible for the patient. Intentional relaxation should be practiced on a regular basis, and the patient should be instructed to never (within reason) ignore the urge to defecate. It is difficult to expect one body system to maintain regularity, while all the rest are in chaos.

Ingredient Options

There are several categories of ingredients for the treatment of constipation and nearly all of them are natural ingredients. They include osmotic agents, bulking or hydrophilic laxatives (primarily fibers), lubricating agents and stimulant laxatives.

Osmotic agents

Osmotic agents are essentially ions that, because of their amount or poor absorption, retain water in the colon to maintain osmotic balance and provide for a laxative effect. The most popular of these are poorly absorbed magnesium salts such as magnesium sulfate (Epsom salts) and magnesium hydroxide (milk of magnesia). Some sugar alcohols such as sorbitol and mannitol also have this same property, as does glycerin which is more often used as a suppository. Ascorbic acid, in higher doses, also has the same effect on the stool. Made popular by Linus Pauling, it is commonly known that high doses of ascorbic acid will induce "bowel intolerance". This may have other benefits, but should be used for short-term treatment only, except where the physician is familiar with high-dose vitamin C regimens.

Bulk Laxatives

These are the safest laxative for most individuals and should be considered first in the way of treatment for idiopathic constipation. As was mentioned above, fiber from food sources should be considered first, as the additional phytonutrients derived from these foods is beneficial for disease prevention, although many "therapeutic fibers" have additional benefits as well. Bulk fibers are also "dietary fibers" although they are usually in concentrated forms and are primarily soluble fibers.

Flax seeds

Flax seeds should be considered food, but are included here because most individuals don't consume flax except by intentional supplementation. Flax seeds have so many benefits it is beyond the scope of this review to cover them all in depth but a few of the most important will be mentioned.

Flax (*Linum usitatissimum*) is one of the most versatile plants for human use. The stem fibers can be used for paper

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and linen and the seed is important for its omega-3 essential fatty acid (alpha-linolenic acid), its fiber content (25% soluble) and its lignan content. It is this combination that makes flax seeds one of the most versatile, although sometimes forgotten, healthy foods. There are few people who would not benefit by adding flax, in one or more forms, to their daily diet. Its ability to help in constipation is due to its combined fiber/mucilage and oil which adds both bulk and lubrication to the stool. Its lignin components are currently being investigated for their role in the prevention of breast cancer, prostate cancer, blood sugar dysregulation, lipid dysregulation and its potential phytoestrogenic effects. Of course the oil from the flaxseeds has numerous benefits as well (see *The Standard* Vol. 3 No. 2 for additional information on flaxseed oil). As flaxseeds contain so much polyunsaturated oil, seeds are usually purchased and ground just prior to use, although freshly ground flaxseeds can be purchased and kept refrigerated. Flaxseed oil is typically sold in bottles or softgel capsules, while purified flax lignans are typically found in powder, capsule or tablet products.

Psyllium Seed Husks

Psyllium (*Plantago psyllium*) or Ispaghula (*Plantago ovata*) is perhaps the most widely used ingredient in natural bulk laxative, and for good reason. The husk powder is nearly all soluble fiber (71% by weight) and it has extremely high water holding capacity. As a bulk laxative it increases both stool frequency as well as stool weight.

The use of psyllium for the relief of constipation has been confirmed by randomized controlled clinical trials as well. Several clinical trials have compared the use of psyllium with other laxatives and have found it superior in almost all cases (37). In one such trial, compared to the stool softener/laxative docusate sodium, patients on psyllium (5g b.i.d.) had significantly more frequent bowel movements and increased stool water output in 2 weeks (38). In addition, psyllium seeds have proven useful in relieving constipation in patients with Parkinson's disease (39), maintaining remission in patient with ulcerative colitis (40), and reducing the potential for gallbladder disease (41). Ironically, the water holding capacity of psyllium that make it so effective in treating constipation, is also capable of controlling both fecal incontinence and radiation induced diarrhea (42, 43). The bowel regulating aspects of psyllium is just one aspect of its therapeutic use however.

The FDA has approved a health claim for lowered cardiovascular risk for foods containing psyllium, along with beta-glucan from oats. The modest, but significant drop in both total and LDL cholesterol is consistent in both short-term and long-term clinical

trials (44, 45, 46). The ability to prevent the reabsorption of bile (made from cholesterol in the liver) is one of the proposed mechanisms for its hypocholesterolemic effects; other mechanisms are currently being investigated (47). While this hypocholesterolemic effect has been reported with other soluble fibers, in a study comparing 10 different fibers, psyllium-fed rats had the lowest serum and liver cholesterol levels (48).

One of the more recent focuses of psyllium research is on its ability to modulate the glycemic response of foods and lipid and glucose lowering effects in type II diabetics. The addition of 15 grams of psyllium fiber to white bread was able to decrease the serum glucose (AUC-glucose) by 40% in type II diabetic patients (49). This same 15 gram dose (5 g t.i.d., taken before meals), significantly reduced plasma glucose, total and LDL cholesterol and triglycerides while significantly increasing HDL cholesterol in 6 weeks. Similar results were obtained when type II diabetic patients received similar doses (50) or when they consumed only 5 grams twice per day (51). The postprandial glucose and insulin effects are also seen in "healthy" non diabetic subjects (52). This simple treatment would likely have wide-ranging application to the growing numbers of adults diagnosed with metabolic syndrome (Syndrome X).

The long-term safety of psyllium-containing supplements is extremely high, with the exception of those individuals who are allergic to psyllium. These products, as with other bulk laxatives should not be used by individuals with bowel obstructions or narrowing of the esophagus or gastrointestinal tract. Psyllium is unlikely to cause reduction in vitamin or mineral absorption (53, 54), but may result in lowered absorption of supplemental oils if consumed with the fiber supplement (Fish oils, Flax, CoQ10, Vitamin E etc).

Glucomannan

Glucomannan is a highly viscous fiber derived commercially from the tuber root of *Amorphophallus konjac* and is thus often called konjac-mannan in the literature. While the body of research is smaller than with psyllium, glucomannan has much of the same potential. As little as 3 grams per day was sufficient to statistically improve bowel movement frequency in patients with chronic constipation (55); and increasing to 4 grams per day nearly doubled the effect (56). Additionally, glucomannan was used safely and effectively in neurologically impaired children with chronic constipation (57).

As one would expect, glucomannan has an impact on glucose and lipid parameters, especially in patients with insulin resistance. In two related studies conducted at the University of Toronto, Canada,

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glucomannan (8-13 grams per day) enriched biscuits were able to reduce several cardiovascular risk factors (including a slight but significant reduction in systolic blood pressure) in patients with type II diabetes (58) and reduce a host of cardiovascular risk factors in Syndrome X patients (59). These findings confirmed other research showing a 10% drop in serum cholesterol, 7% drop in LDL-cholesterol, 23% drop in triglycerides and a 2.5% drop in systolic blood pressure after 4 weeks of a 4 gram/day addition of glucomannan (60).

Other Fiber Supplement Ingredients

Many other soluble and insoluble fibers have been used as ingredients in foods and dietary supplements. One of the more popular is guar gum, derived from the seed of the East Asian plant *Cyamopsis tetragonoloba*. Used quite often in foods and beverages to add viscosity, it has also been researched for its effects on insulin and blood lipids, with excellent success (61, 62, 63, 64), although not so much for its effect on chronic constipation. Other ingredients that one is likely to see in addition to those mentioned already are: pectin (apple or citrus), wheat and oat bran (more common in foods), sugar-beet fiber, fenugreek fiber, other gums (locust bean, karaya), celluloses, and fructoligosaccharides (FOS), each with varying levels of activities and published literature.

Stimulant Laxatives

Botanical stimulant laxatives all generally contain a class of compounds referred to as anthraquinone glycosides. Once ingested and activated by bacterial metabolism in the human gut, these molecules promote water retention in the stool and stimulate increased peristalsis in the large intestines.

Aloes

Aloes powder is the solid residue obtained by evaporating the liquid which drains from the transversely cut leaves of Cape Aloes (*Aloe ferox*). The juice is usually concentrated by boiling and solidifies upon cooling. It is characteristically dark-brown or greenish-brown. It has a sour odor; the taste is bitter. Cape Aloes is found primarily on the Cape Horn of South Africa where it can typically grow 6-10 feet tall. The best-characterized constituent of the resin is aloin, one of the compounds in the family of anthraquinone glycosides. Other similar quinones are also present. It is thought that aloin and similar derivatives are converted into emodin-derivatives within the gastrointestinal tract and then these act as purging laxatives (65-68) Aloes' effect is primarily caused by its influence on the motility of the colon- an inhibition of stationary and

stimulation of propulsive contractions. This results in an accelerated intestinal passage and, because of the shortened contraction time, a reduction in liquid absorption. In addition, stimulation of active chloride secretion increases the water and electrolyte content in the stool. The preparations of aloes have been in the U.S. Pharmacopoeia for over 100 years and it has a positive Commission E monograph where it is listed for short-term constipation (69).

Despite aloes long-term use and reputation as the most potent natural laxative, cascara sagrada and senna seem to be more popular because of the commonly held notion that aloes is more often associated with side-effects such as cramping and nausea. This however has not been the case when used in recent decades as a dietary supplement and likely is attributed to information passed on from the use of preparations nearly a century ago (70).

Dosing aloes is different depending on the individual. The optimum dose is the smallest dosage necessary to obtain a soft stool that passes without difficulty. For many individuals this is one 250 mg capsule, although many may need 450 mg or more to obtain this effect. Twenty four hours should be allowed to pass before the next dose is administered. Aloes should not be used during pregnancy because of its uterine stimulant potential. Anthroquinones are known to be secreted in breast milk of nursing mothers and this may purge the child along with the mother. As with all stimulant laxatives, aloes should not be used for longer than 2 weeks for most individuals.

Cascara sagrada and Senna

Considered "sacred" bark by those using it, cascara sagrada describes the small to medium-sized tree *Rhamnus purshiana* (or *Frangula purshiana*). The primary use for cascara sagrada is as a laxative, and has a long history of use among Native Americans and Western herbalists. The German Commission E has a positive therapeutic monograph for laxative formulas with a dose corresponding to 20-30 mg cascaroside A (or equivalent).

The dried leaflets and pods of *Cassia senna* (or related species), is most often referred to medicinally as senna. These preparations contain the strong glycosides sennoside A and B. The laxative preparation for senna has been used in medicinal teas in Europe, and powdered extracts have become very popular in OTC medications here in the U.S. The typical dose is 0.6-2 grams (equivalent to 20-30 mg of sennoside B). Senna also has a positive Commission E monograph for use in laxative formulations. Similar activities are found in Rhubarb root preparations (*Rheum officinale*), although rhubarb is more commonly used in Asia.

(continued from page 7)

Cautions with Stimulant Laxatives

The use of botanical stimulant laxatives should be considered only after diet, lifestyle, and bulk laxatives have proven ineffective, and other causes have been ruled out. They are contraindicated in cases of bowel obstruction, acute intestinal inflammation and abdominal pain of unknown origin. They should not generally be used in children under 12 or in pregnant or nursing women.

Overuse and abuse of laxatives is common. Potential dangers include electrolyte imbalance, especially potassium deficiency which can lead to muscle weakness and heart function disorders. This potassium imbalance can be further exacerbated by the use of thiazide diuretics, corticoadrenal steroids or high doses of licorice root. Chronic use of anthraquinone glycosides has been associated with an increased pigmentation of the intestinal mucosa called pseudomelanosis coli. While this has been

determined to be a benign condition, it is diagnostic for laxative abuse and often alters the ability to diagnose other colon diseases (71, 72). While the available evidence is divided on whether chronic use of stimulant laxatives will result in a condition of a “sluggish” colon, all attempts should be made to move to bulk-forming laxatives and refrain from chronic use of stimulant laxatives.

Conclusion

Idiopathic constipation is commonly self-treated in the U.S. This does not mean, however, that it is being treated effectively. Most patients will choose easy solutions, rather than alter diet and lifestyle factors that will change their bowel habits. The information presented here should help to show that most of the natural remedies that promote bowel regularity, have numerous other health benefits as well.

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