Nutritional Intervention for IBS

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Background

Prior to medical school when I was a practicing dietician, I had the privilege of working with many patients who had irritable bowel syndrome (IBS). I found the subject of nutritional intervention related to IBS to be very rewarding and often challenging because there is no "perfect" diet for this syndrome. In light of the different etiologies potentially at work in each patient with IBS, nutrition therapy should be carefully and thoughtfully tailored to each person. This can be likened to times past when a cobbler hand-made each person's shoes. Since each IBS patient can differ dramatically, careful documentation of exacerbating factors listed in the IBS diary maintained by patients may yield important clues to an effective approach to diet and nutrition. One of the issues is that patients with IBS may have a lower threshold to stressors compared to people without IBS. An example of this is patients with carbohydrate intolerances as well as a diagnosis of IBS, who experience an even greater response to problematic carbohydrates such as lactose or fructose as compared to someone who does not have IBS. Another important issue is being alert to unnecessary food aversions. Individuals may experience abdominal discomfort and associate this with eating a certain food, so they decide to avoid eating that particular item, even for life. This may lead to excessive food restriction and the potential for a full-blown eating disorder. What must be kept in mind is that IBS is characterized by increased gut and central nervous system (CNS) reactivity to stressors, and that these stressors can include any dietary excesses as well as sensitivities to particular foods that are unique to the individual rather than to the IBS condition. This article reviews some of the literature in this area and then presents some treatment options to be considered in the nutritional management of IBS. It should be noted that the research and peer-reviewed published literature regarding IBS and diet is still very limited and, therefore, some of the resources cited in this article will date back several years.

Nutritional Factors Influencing Motility: Fiber, Fat and Caffeine

IBS is the most common of the functional GI disorder, affecting approximately 10-15% of the US population (1). IBS is a multifactorial illness with several different emerging pathophysiologies, including disorders of motility, visceral hypersensitivity, central processing dysfunctions, psychological factors, and post-infectious inflammation.

Fiber: A recent survey reported that close to 95% of general practitioners believe that fiber deficiency is the main cause of IBS. In fact, the most common dietary advice offered to patients with IBS is for them to increase their intake of fiber, primarily to address the constipation that may be associated with IBS. However, since IBS is also associated with visceral hypersensitivity, luminal distension -- as might be caused by the bacterial fermentation of insoluble fiber derived from plant

foods that are poorly digested by human enzymes. A fiber-enriched diet can relieve constipation, accelerate intestinal transit time, and may reduce intracolonic pressure. Furthermore, the intake of fiber is associated with a reduction in the intraluminal concentration of bile acids, which may reduce the contractile activity of the colon (3, 4). There are two types of fiber -- soluble and insoluble. Soluble fiber is derived from fruits and grains, and is fermented in the colon to form short chain fatty acids. Good sources of soluble fiber include oats, psyllium seed, pectin, and guar gum. Insoluble fibers consist of the outer husk of the grain and generally tend to decrease transit time. The national nutrition guidelines recommend an intake of 20-30 grams of fiber per day, yet the typical American consumes less than 10 grams of fiber per day. Fiber intake should be increased gradually in IBS patients with constipation, with an emphasis on including adequate water consumption (5). The overall fiber picture can become a bit more confusing than a simple recommendation to increase fiber intake. Insoluble fiber may have a high content of cereal bran, which is the outer husk of the grain. A recent paper investigated the effects of adding or omitting bran and found conflicting results. It appears the primary care provider may see a greater benefit from patients adding fiber to their diet than the gastroenterologist, possibly because primary care physicians see mostly milder forms of IBS and gastroenterologists see patients with more severe IBS. Whorwell studied 100 patients in a primary care setting that were encouraged to increase cereal bran. The results in the primary care provider scenario produced a "mixed" picture -- 22% reported worsening of IBS symptoms while 27% who showed improvement. This may be the result of visceral hypersensitivity triggered by bran consumption. Whorwell recommends that patients identified with IBS and visceral hypersensitivity should be counseled to exclude cereal (insoluble) fibers for a brief period to see if symptoms improve, especially if this is within the care of a specialty clinic. Another study found that cereal fibers were associated with a 55% worsening of symptoms (6, 7). Thus, if the goal is to increase transit rate and increase the frequency of bowel movements (for IBS-C), one could add insoluble fiber to the diet; however, since IBS is also associated with visceral hypersensitivity, if discomfort/pain or bloating occurs, the patient may need to switch solely to soluble fiber.

Caffeine is a gastrointestinal stimulant. For IBS patients with diarrhea, a period of caffeine exclusion may prove beneficial. The total intake of caffeine-containing beverages by many adults and children often reaches levels that can induce pharmacological effects. Evidence associating caffeine with GI symptoms suffered by patients with IBS is limited in the current literature, but one study revealed that caffeinated coffee stimulated colonic motor activity in a magnitude similar to that of an entire meal and had a 60% stronger effect than ingesting water (8).

Dietary fat is also a potent modulator of gut motor function. This macronutrient delays gastric emptying time and accelerates small bowel transit rates. Symptoms of bloating are commonly reported after consuming a high-fat meal. Serra et al. found that after an infusion of enteral fat, the volume of retained gas increased from 298 to 505 ml (9, 10). For patients who need to limit their fat

intake, counting actual fat grams in the diet can be an excellent way to identify high-fat food sources. In general, IBS patients should aim for only 40-50 grams of fat per day. If weight loss becomes an issue with fat restriction, medium chain triglycerides (MCT) are an excellent source of calories. Unfortunately, MCT oils are expensive and, due to taste issues, are generally not well-received by patients.

Food Allergy, Hypersensitivity and Intolerance

Although up to 45% of the population reports adverse reactions to food, the actual prevalence of immune-mediated food allergy is unknown. Symptoms are more common in atopic individuals who often have allergies to non-food antigens as well, such as pollens, and in young children who tend to outgrow an allergy. The role of food allergy in IBS has not been studied well. Surveys indicate that 40-70% of food-allergic patients report GI symptoms including nausea, vomiting, abdominal pain, bloating, and diarrhea. Stefanini et al. conducted a 4-week multi-center study comparing the efficacy of the mast cell stabilizing agent sodium cromoglycate at 1500 mg per day with an elimination diet, and 67% of the patients reported improvement in their symptoms (11). Attempts to "test" for food hypersensitivity in IBS have largely focused on the classic food allergy, which is based on the presence of IgE -- immunoglobulins of the "immediate type". These antibodies attach to certain cells in the body that release chemicals that cause anaphylaxis. Present speculation in the literature suggests that adverse reactions to food in patients with IBS might be due to forms of immunological mechanisms other than a dietary allergy, namely IgG antibodies. These tend to have a delayed response following exposure to a particular antigen and have been implicated in some cases of food hypersensitivity. IgG studies surfacing in the IBS literature are promising, but the issue of the validation of serum IgG testing is often raised. Atkinson et al. observed significant improvement in IBS symptoms in elimination diets using Elisa IgG antibody testing. Their results suggest that IgG antibodies may have a role in helping patients identify candidate foods for elimination (12). Collins et al. also found significant change in patients receiving the IgG exclusion diet. The foods that were most frequently associated with elevated IgG levels were yeast, milk, eggs, wheat, cashew nuts, peas, almonds, and barley. The mechanism by which the IgG antibodies have a detrimental effect is unclear, but most likely is associated with low-grade inflammation (12,13). For the most part, most patients with IBS do not have immune-mediated allergies to food and, more likely, have increased sensitivity to the direct effects of food on digestive function including increased food volume ingestion and the addition of fats, caffeine, carbohydrates, alcohol, etc.

Food Intolerance and Exclusion Diets

Niec recently summarized the literature on clinical trials using food elimination diets followed by rechallenge. Of the seven studies included in their review, positive response rates varied from 15 to 75 percent. A higher rate of response was correlated with diarrhea-predominant IBS. Milk, wheat and eggs were the most frequently implicated foods

(14). Although the principle of food elimination or exclusion appears straightforward, it can be very demanding for the patient. If the patient appears hesitant or confused about food choices, physician referral to a registered dietitian may be helpful. With the exclusion of entire food groups, such as dairy products, the risk of developing a nutritional deficiency must be considered.

Carbohydrate Malabsorption

Carbohydrate intolerance can be seen in many patients with IBS. Fructose, lactose and sorbitol malabsorption are common among patients who have IBS, and dietary restriction of these sugars may improve symptoms (15,16). One study found that 42% of IBS patients developed symptoms from sorbitol-fructose mixtures compared to 3.5 % in the control group (18). This could be an important factor when patients are consuming large amounts of weight-loss products or have diarrhea-predominant IBS. *Lactose* malabsorption occurs when lactose, the primary sugar in dairy products, is not completely digested and absorbed in the small bowel. Lactase, the enzyme required to hydrolyze lactose for intestinal absorption, is found primarily in the tips of the jejunum. When unabsorbed lactose reaches the colon, colonic bacteria uses this substrate for fermentation, producing gas and short chain fatty acids. The unabsorbed lactose also affects osmolality, causing water to be drawn into the bowel and accelerating the intestinal transit time. If lactose intolerance is suspected, it can be confirmed with a hydrogen breath test. Lactose intolerance appears to be dose dependant. This means that many patients can tolerate small amounts of dairy products throughout the day, such as ½ cup of milk, but not larger amounts. Although it may seem obvious which foods contain lactose, some sources may be difficult to discern. Patients should look for hidden sources in baked goods, salad dressings, and powdered mixes. Labels with the following words contain lactose: nonfat dry milk, milk powder, dry milk solids, whey curds, and caseinate milk sugar.

Contrary to popular belief, acidophilus milk does not have the lactose sugar digested and is, therefore, a poor substitute for regular milk. Soymilk and rice milk do not contain lactose and are, therefore, good dairy substitutes. However, these products are often low in calcium and vitamin D. Hard cheeses and cultured yogurt are usually acceptable alternatives. For patients who do not tolerate lactose but want to consume dairy products, supplemental lactase enzymes are available. Several studies have shown that patients with lactose intolerance have significantly less calcium intake than those who tolerate lactose. In one study, patients who were lactose intolerant had a calcium intake of approximately 300 mg per day (18), which is only 20-40% of the recommended calcium intake for adults. Patients with lactose intolerance have also exhibited decreased bone mass density (19). In light of the potential for compromised calcium and vitamin D intake, it would be prudent to evaluate all patients with lactose intolerance for a calcium supplement if needed.
Fructose is a hexose sugar that is highly utilized in the western diet. In the past 20 years, there has been a 10-fold increase due to its use in highly processed food products. It is often used as high fructose corn syrup in soda, fruit juices, cookies, baked goods, jellies, and candy. Unlike glucose, which is completely absorbed, fructose absorption capacity is limited. Therefore, when ingested in

small quantities, dietary fructose will probably not be an issue. However, when consumed in larger amounts, fructose may serve to osmotically draw fluid into the intestinal lumen. This may cause distension of the small intestine and produce symptoms such as abdominal pain, bloating and discomfort. Furthermore, after reaching the colon, unabsorbed fructose may be fermented by colonic bacteria, producing excessive gas (20).

Probiotics

Several studies now exist defining the potential role of probiotics in IBS. These papers have exhibited a great degree of variability, possibly due to the use of different probiotic strains, their ability to adhere and colonize in the GI tract, and the number of colony-forming units actually ingested by the individual. The probiotics most often studied are lactobacillus, bidifobacterium, and some non-pathogenic forms of e-coli. In a recent study, bifidobacterium 35624 significantly alleviated symptoms of abdominal pain and discomfort, bloating, and distension. There was also a normalization of IL-10/IL-12 ratios (this skewed cytokine ratio may be indicative of a proinflammatory Th-1 state). The bifidobacterium used in this study is currently unavailable in the US marketplace in the concentrations used in this study (21,22). Food products that are high in probiotics include fermented milk, pourable yogurt, and yogurt with live active cultures.

Currently, there is no federal agency in the US that routinely tests or "polices" the market to ensure standardization and quality of probiotic products. Independent tests have revealed that up to 30% of probiotics on the market are "laced" with reasonably adequate live bacteria. One study used DNA extraction to test five probiotic products at a local health food store. The PCR analysis revealed that 2 of the 5 products did not contain the bifidobacterium claimed on the label (23). I called a well-known dairy in the Midwest several years ago. The technician responsible for mixing the probiotic in the yogurt explained that the bacteria are added to a very large vat of product. The yogurt is then packaged in individual cartons and there is no final definitive measurement to ensure that the amount of probiotic stated on the label is actually in each individual container.

Putting It All Together

Due to the complex underlying pathophysiologies in patients with IBS, nutritional intervention will vary with each patient. The following general IBS categories attempt to help "map" an approach for dietary manipulation in the patient with IBS. For individuals with diarrhea predominant IBS, consider limiting nutrients that exacerbate GI motility or intestinal secretion -- caffeine, fat and some carbohydrates (fructose, lactose and alcohol sugars). Probiotics can also be of benefit, especially if post-infectious IBS or bacterial overgrowth is suspected, or the patient has had numerous antibiotic therapies in the past. If constipation is the main issue, make sure the patient has had an adequate trial of increased insoluble fiber. This usually means that the patient needs to count fiber grams and seek to attain 20 grams of fiber per day. When visceral hypersensitivity is suspected, ask the patient to limit the amount of food eaten in one session and instead to eat three

small meals per day with snacks. A low-fat diet and avoidance of insoluble fiber may also be helpful for these patients.

Targeting nutritional intervention in the patient with IBS can be challenging due to the many different etiologies of this syndrome and the fact that some patients have heightened responses to different foods. A food diary kept by IBS patients can be a particularly helpful way to ascertain which foods may be problematic. It is recommended that the clinician look for food "trends" in the journal, with the goal of steering the patient away from excessive food restriction behaviors.

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