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CASE REPORT

THE USE OF PROBIOTICS IN THE TREATMENT OF IRRITABLE BOWEL SYNDROME: TWO CASE REPORTS

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Irritable Bowl Syndrome (IBS) is defined as a functional gastrointestinal (GI) disorder that includes a combination of chronic or recurrent GI symptoms that cannot be explained by structural or biochemical abnormalities. Symptoms remain the only method of identifying IBS because a clear biologic marker for the disorder has not been found. The main symptom criterion is abdominal pain that is relieved by defecation or that is associated with changes in frequency or consistency of stools. Disturbed defecation, such as altered stool frequency, altered stool form, or passage of mucus may also be present in IBS. The Rome criteria is a highly sensitive and specific tool that is widely used for the purpose of diagnosing IBS.[1]

IBS is reported to affect as much as 20% of the adult population in the US,[2] and is reported as the leading cause of work absenteeism, second only to the common cold.[3,4] IBS affects an estimated 15 million individuals each year in the US, which represents 12% of the primary care practice and 28% of the gastroenterological practice.[5] The estimated average total cost (direct plus indirect) per patient with IBS in the US is $4,527 per year,[6] which suggests that approximately $67 billion is spent yearly in the US on this disease. In spite of the marked prevalence and cost of this disorder, the pathophysiology of IBS has yet to be clearly elucidated.

An array of factors have been implicated in the etiology or exacerbation of IBS, including inadequate dietary fiber, gastroenteritis, bacterial overgrowth, antibiotic use, surgery, emotional stress, food intolerance or food allergy, and genetic predisposition. Treatment approaches using conventional therapy are varied and include bulking agents, adsorbents, laxatives, antidiarrheal agents, antispasmodics, analgesics, antidepressants, anxiolytics, seratonin antagonists, stress management, psychotherapy, and exclusion diets. Results have been mixed, and perhaps as a result of the lack of a clear consensus on appropriate therapy, complementary and alternative medicine (CAM) techniques are growing in popularity.[7] One CAM therapy that has been the focus of ongoing research is the inoculation of the digestive tract with probiotics (ie, live microbial food supplements) that alter the enteric microflora.

THE USE OF PROBIOTICS FOR IRRITABLE BOWEL SYNDROME

Researchers have noted a correlation between the onset of IBS and a recent episode of gastroenteritis or the recent use of antibiotics. It has been postulated that this antecedent causes a disruption in the qualitative nature of the colonic microflora and may predispose an individual to low-level inflammation and the development of IBS. Collins et al reported an increased number of inflammatory cells in the intestinal mucosa of some IBS patients, and suggested that these flora alterations result in a subgroup of IBS sufferers who had "minimal mucosal inflammation."[8,9] Other human and animal studies support the concept that inflammation may disturb gastrointestinal reflexes and activate the visceral sensory system even when the inflammatory response is minimal and confined to the mucosa.[10]

Evidence also suggests that microflora from patients with IBS may differ quantitatively from those who do not have the syndrome. Balsari et al reported a significant decrease in the number of coliforms, lactobacilli, and, to a lesser extent, bifidobacteria in patients with IBS compared to controls.[11] Si et al reported that compared to matched controls, the number of fecal bifidobacteria was significantly decreased and that of *Enterobacteriaceae* was significantly increased in IBS sufferers.[12] Additionally, King et al reported increased gas fermentation and gas production in patients diagnosed with IBS compared to controls, which they postulated may be associated with the level and activity of hydrogen-consuming bacteria.[13] The results of this research suggest that a changed bacterial population, possibly qualitatively as well as quantitatively, may be an underlying etiological factor in a subset of IBS sufferers.

The idea that reinoculation of specific strains of bacteria (ie, probiotics) may improve the microflora imbalance is not new. Although the history of this treatment dates back 50 years, only a handful of studies have been reported in the literature. The earliest reported publication was in 1955, when Winkelstein compiled a series of case studies from his private practice. These included 26 cases of constipation, five cases of "functional" diarrhea, and four cases of alternating diarrhea and constipation. He reported resolution of symptoms in 33 of the 35 cases with daily administration of an unidentified strain of *Lactobacillus acidophilus* that contained 100 billion live organisms.[14] It was not until the 1980s, however, that controlled trials were conducted. They have shown mixed results. Halpern et al reported a modest improvement in IBS symptoms using a specific strain of *L acidophilus* (Lacteol Fort, Axcan Pharma) versus placebo in a study that was conducted on

100 patients with IBS.[15] Niedzielin et al reported a 75% improvement in patients treated with *Lactobacillus plantarum*, versus a 23% improvement using trimebutine and a 30% improvement when using mebeverin.[16] More recently, he reported results of a 40-patient, four-week, double-blind, controlled trial that found 95% overall improvement (abdominal pain and normalization stool frequency) in the group treated with *L plantarum* (20 billion colony-forming units [CFU]/daily).[16] Nobaek et al showed a statistically significant improvement in flatulence but no difference in bloating or pain when administering 20 billion cfu/daily of *L plantarum* in a 60-patient, four-week, double-blind study.[17] Most recently, Quigley et al compared the effects of *Lactobacillus salivarius* versus *Bifidobacterium infantis* versus placebo in an eight-week, double-blind, placebo-controlled trial and found superior improvement in patients on *B infantis* versus placebo or *L salivarius*. The effect dissipated four weeks after ceasing supplementation.[18] They also found that at baseline, patients demonstrated an abnormal interleukin-10:interleukin-12 ratio, which normalized in the *B infantis* group. This suggests an inflammatory component of the syndrome.[19] A trial conducted by Saggioro looking at the combination of *L plantarum* and *Bifidobacterium breve* or *L plantarum* and *L acidophilus* showed statistically significant improvement compared to placebo in a group of IBS patients.[20] Other studies have been less positive. Kim et al reported that VSL#3 (450 billion lyophilized bacteria daily) had borderline significance in abdominal bloating but no effect on other individual symptoms of abdominal pain, gas, or urgency.[21] Placebo-controlled studies such as those of Newcomer et al using *L acidophilus* (NCFM strain),[22] O'Sullivan et al using *Lactobacillus casei* GG,[23] and Sen et al using *L plantarum*[24] also have been less positive.

In our clinical experience, IBS has often responded to probiotic supplementation—either as monotherapy or in conjunction with other therapies—in individuals who have chronically suffered from the disease. In a retrospective assessment done on 39 patients, Faber has reported the results of using a *L acidophilus* strain (NCFM) at a dosage of 30 billion CFU/daily. The majority of these patients showed significant improvement, as measured by quality-of-life and symptom frequency questionnaires before and after four to six weeks of supplementation.[25] However, many of these patients were treated with other natural therapies concurrently, so the results should be viewed cautiously.

The following case studies further illustrate some of our experience in the clinic with the use of probiotics in IBS patients.

Case Report One

LD, a 65-year-old white female, presented with digestive complaints of gas and bloating. These symptoms had been life-long, but had improved significantly two years prior to this presentation when she had been placed on peppermint oil and a wheat-exclusion diet. Her symptoms had gradually returned, however. She began experiencing severe pain in her lower abdomen a year before presentation. After a colonoscopy was performed and found to be negative, she was officially diagnosed with IBS. She reported bloating and gas after eating, which was relieved by a bowel movement (BM). She was having three to four poorly formed BMs daily.

LD's medical history included hypertension, controlled with medication, and mild hyperlipidemia, not well controlled. Her surgical history included a hysterectomy in 1980 and a cholecystectomy in 1990. She reported no family history of inflammatory bowel disease (IBD) or IBS.

Physical examination was unremarkable except for mild abdominal tenderness in the lower right quadrant and overall dry skin. LD's subjective findings were measured through completion of the Quality-of-Life with Irritable Bowel Syndrome (IBS-QOL), IBS Frequency (IBS-FQ) and IBS Bothersomeness (IBS-BQ) questionnaires. Table 1 summarizes the questionnaire scores throughout the study.

LD was started on a dairy-free probiotic supplement containing live *L acidophilus*, NCFM strain, and live *B infantis*. She was instructed to take two capsules twice a day with food for a total of 40 billion CFU/day. For digestive enzyme support, she was instructed to take one to two tablets of a supplement containing a combination of enzymes (including proteases, lipase, and amylase, among others) with each meal. For digestive immune support, she was instructed to take a whey protein concentrate containing 400 mg of immunoglobulins per day. Additionally, she was asked to reduce her intake of simple sugars.

At a follow-up visit three weeks later, LD reported that within the first week after starting the supplements she experienced a considerable decrease in bloating, and that at the time of the visit the bloating had completely dissipated. She also reported that the right-side abdominal cramping had resolved. She was having one well formed bowel movement per day.

Between weeks six and nine, LD was asked to decrease the probiotic supplement by half. She was also asked to discontinue the digestive enzyme supplement and whey globulin supplement and to restart them only if symptoms returned. At 13 weeks, she did not have symptoms of IBS. LD was followed for an additional two years taking only the probiotics for her IBS symptomatology.

TABLE 1 Questionnaire Scores (Case Report #1)

	Initial visit	4-month follow-up visit	12-month follow-up visit
IBS-QOL – (range 0-100)	19.1	88.2	91.9
IBS-FQ – (range 0-78)	39	12	14
IBS-BQ – (range 0-78)	46	9	12

The IBS-QOL is a well-validated self-administered questionnaire that measures the quality of life in IBS patients through evaluation of symptoms, functional status, perceived quality of life and social disability. Higher scores indicate a better quality of life, and lower scores indicate a poorer quality of life. IBS patients with high/frequent symptoms score <60; IBS patients with mild to no symptoms score >70. The IBS Symptom Frequency questionnaire (IBS-FQ) and the IBS Symptom Bothersomeness questionnaire (IBS-BQ) are often administered with the IBS-QOL questionnaire to assess the severity of IBS symptomatology. Lower scores (<20) indicate infrequent or no symptoms; scores > 40 mean symptoms are often or always present. NOTE: It is expected that higher scores in the IBS-FQ and IBS-BQ will result in lower scores in the IBS-QOL questionnaire and vice versa.

In May of 2003, she was taking 20 billion CFU of lactobacillus and bifidobacteria daily, and she noted no problems with gas, bloating, or abdominal discomfort.

Case Report Two

JT, a 56-year-old white female, presented with classic symptoms of IBS. She reported that since her teen years she had suffered with bouts of diarrhea with urgency alternating with constipation. This was coupled with abdominal pain, gas, and bloating. She noted that the pain was occasionally relieved with a BM. She had identified lactose, fish, and stress as triggers. However, flare-ups often occurred for no apparent reason. She had seen a variety of doctors and tried numerous medications and over-the-counter remedies with only partial and temporary success.

JT's medical history included borderline hyperlipidemia and osteoarthritis of her hands. Hypothyroidism was controlled with medication. JT was menopausal and used natural estrogen replacement therapy, Tri-Est (custom compounded), 2.5 mg/100 mg. She took famotidine (Pepcid, Johnson & Johnson) as needed for acid reflux. A few months before presentation, she had undergone a cholecystectomy to relieve gallstone attacks. She noted no alleviation of IBS symptoms after the procedure, however. She reported no family history of IBS or IBD.

Physical examination was unremarkable except for tenderness in all abdominal quadrants and bilateral hypertrophy of the distal interphalangeal joints of all fingers. JT's subjective findings were measured through completion of the IBS-QOL and IBS-FQ. Table 2 summarizes the questionnaire scores throughout the study.

JT began probiotic therapy with no modifications to her diet. She was instructed to take a probiotic supplement containing a combination of *L acidophilus* (NCFM strain) and *B infantis* (a total of 40 billion CFU/day) two capsules twice a day with food.

At the four-week visit, JT reported considerable improvement in gastrointestinal pain. At eight weeks, the pain had resolved.

DISCUSSION

The study of probiotics in the treatment of IBS poses many difficulties. First, there are problems in assessing and analyzing the complex composition of the intestinal flora. Second, there is the challenge of the inherent differences and variations between individual patients presenting with this syndrome. Inconsistencies in the published literature likely relate to these issues, as well as to the various strains employed, widely variable dosages, and dissimilar trial designs and endpoints. It appears that not all probiotic bacteria have a similar therapeutic effect.

In our respective clinical practices, we have been able to successfully apply probiotic supplementation to a number of patients who have presented with a variety of IBS symptoms. The cases reported here are representative examples in which the use of probiotics alone or in combination with other nutraceuticals and/or dietary changes have resulted in improvement. Although the hypothesis of microflora perturbations leading to or exacerbating IBS symptomatology is enticing, the mechanism of action is unclear, and documentation of benefit is inconsistent. Clearly, more studies are needed, and at present, the use of probiotics in the treatment of IBS remains empirical. The therapy is safe and relatively inexpensive. Our experience suggests that probiotic supplementation can be an important part of therapy in certain individuals with IBS.

TABLE 2 Questionnaire scores (Case Report #2)

	Initial visit	4-week follow-up visit	8-week follow-up visit
IBS-QOL – (range 0-100)	59.6	61.0	74.3
IBS-FQ – (range 0-78)	35	27	8

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