

Nutritional Management of Irritable Bowel Syndrome

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ABSTRACT: Classified as a functional gastrointestinal disorder, irritable bowel syndrome (IBS) is characterized by abdominal pain or discomfort associated with a change in the consistency or frequency of stools. The pathophysiology behind this disorder is not well understood, although symptoms are associated with disturbances in colonic motility and visceral hypersensitivity. Affecting up to 20% of the U.S. population, IBS exacts a huge fiscal toll on society, and the overall societal impact in terms of physical and emotional suffering is immeasurable. While there is no cure for IBS at this time, there

are several natural treatment options that can provide significant relief of symptoms. Dietary adjustments, such as the avoidance of “trigger” foods, and stress management have proven helpful for some patients. Several herbs, such as peppermint and chamomile, have also proven beneficial for their ability to relax intestinal smooth muscle, reduce flatulence, and relieve anxiety. Additionally, the use of probiotics to improve the intestinal microflora environment, or the implementation of a “4R” program of gut restoration, has emerged as a promising treatment of IBS.

The term irritable bowel syndrome (IBS) refers to a collection of intestinal symptoms in the absence of organic disease or underlying structural or biochemical abnormalities.^{1,3} These symptoms include abdominal pain and discomfort, bloating, and changes in bowel habits. IBS is sometimes referred to as colitis, mucous colitis, spastic colon, spastic bowel, and functional bowel disease; however, most of these terms are inaccurate.⁴ No link has been established between IBS and inflammatory bowel diseases such as Crohn’s disease or ulcerative colitis.⁵

While it may seem surprising, IBS is second only to the common cold as a cause of missed work time.³ In fact, IBS affects approximately 15% to 20% of the general population.^{3,6} Although the majority of these individuals do not consult a physician, it is the most common disease diagnosed by gastroenterologists and accounts for 12% of visits to primary care providers.^{4,6} For reasons not yet understood, women are two to three times as likely as men to have the condition; however, this may partially reflect the fact that women are more likely to seek medical care for their symptoms.^{3,5} The fiscal impact of IBS is estimated at \$8 billion in direct costs and \$25 billion in indirect costs annually in the U.S.⁴

DIAGNOSING IBS

IBS is a functional gastrointestinal (GI) disorder whose hallmark is abdominal pain or discomfort and a change in bowel habits.¹⁻³ Patients with IBS have crampy pain in the lower abdomen along with either diarrhea or constipation (sometimes alternating bouts of both). Typically, the pain flares up after a meal and goes away after defecation. Many patients also experience gas and bloating. The symptoms tend to come and go and can occur in any combination.

The diagnosis of IBS is made after excluding the presence of disease, structural abnormalities, or infection. According to the Rome II criteria, a diagnosis of IBS is based on the presence of abdominal discomfort or pain of at least 12 weeks duration (not necessarily consecutive) in the preceding 12 months that is accompanied by at least two of the following features:^{4,6}

- 1) It is relieved with defecation
- 2) Onset is associated with a change in frequency of stool
- 3) Onset is associated with a change in form (appearance) of stool

While many IBS patients have relatively mild symptoms, up to 25% of patients experience severe symptoms that can have a significant impact on their quality of life.³ For these patients, the symptoms often cause a withdrawal from normal activities. While symptoms of IBS eventually fade completely for about 30% of patients, most live with it for the rest of their lives.

ETIOLOGY OF IBS

The etiology of IBS is not well understood, and there is no cure. Research to date indicates that several interacting factors contribute to the development of IBS: disturbed GI motility, altered visceral perception, psychosocial factors, an imbalance in neurotransmitters, and inflammation.^{3,4,6} The symptoms of IBS are likely a result of both abnormal intestinal motility and visceral hypersensitivity. In other words, the IBS patient has a colon that is more sensitive and reactive than usual, with a lower threshold of pain.

Stress and the Brain-Gut Connection

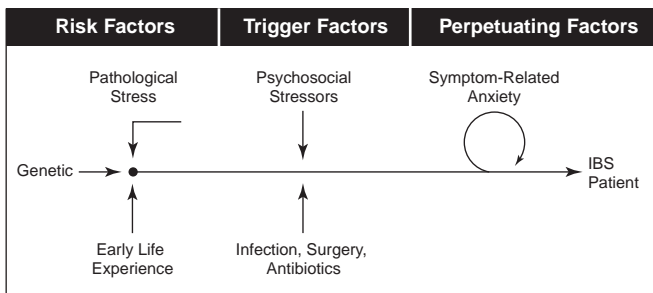
Because an organic cause has not been identified, IBS is often thought to be a result of emotional conflict or stress. Indeed, there is strong evidence for a prominent role of stress in the pathophysiology and clinical presentation of IBS symptoms.^{1,7,8} IBS is fundamentally a

disorder of colon motility and because stress modulates GI motility, it may worsen or even trigger symptoms. However, it is important to bear in mind that while stress does not cause IBS, it can exacerbate symptoms in a large subset of IBS patients.²

In recent years, research has focused on the dysregulation of brain-gut interactions as the pathophysiological basis for IBS.^{1,7} According to Ringel et al. this theory states that, “The experience of symptoms derives from dysregulation of the bidirectional communication system between the GI tract and the brain, mediated by neuroendocrine and immunological factors and modulated by psychosocial factors. Given the complex relationship between inflammatory mediators, gut hypersensitivity, motility, and pain experience, the results of recent research strongly suggest that alterations in neuroimmune and neuroendocrine communications at the enteric and CNS levels may trigger a series of events that gives rise to chronic changes in visceral sensitivity and central mechanisms controlling pain, as evidence of dysregulation of the brain-gut axis.”¹

This brain-gut dysregulation may be triggered by several kinds of events, including life stress, sexual or physical abuse, or acute or chronic intestinal inflammation (Figure 1).^{1,7} It has been reported that many people with IBS have a history of early trauma, including physical or sexual abuse.¹ In addition, a large percentage of IBS patients seeking medical care have an enhanced stress response and higher levels of anxiety than controls.³ Therefore, stress reduction (relaxation) training or counseling and support may help relieve IBS symptoms in some people.

Figure 1. Role of stress in the development and modulation of IBS symptoms.⁸



Effects of Diet

Dietary factors can trigger symptoms of IBS, with the strength of the response often related to the caloric density of a meal and especially the amount of fat in a meal, which is a strong stimulus of colonic contractions.⁵ Certain medicines and foods may also trigger spasms in some people. Chocolate, dairy products, or large amounts of alcohol are frequent offenders.^{1,5} Caffeine causes loose stools in many people, but it is more likely to affect those with IBS. Researchers also have found that women with IBS may have more symptoms during their menstrual periods, suggesting that reproductive hormones can increase IBS symptoms.

CONVENTIONAL TREATMENT OF IBS

As a functional disorder of unknown etiology, treatment focuses on the relief of symptoms. Conventional drug therapies include antispasmodics, bulking agents, antidiarrheal agents, laxatives, serotonergic agents, and antidepressants.¹² However, these drugs have met with limited success in relieving symptoms. A number of natural approaches, such as dietary intervention, fiber supplementation, herbal and nutritional support, and stress management, appear to be effective for many patients.

DIETARY CHANGES AND FIBER

For many people, eating a proper diet lessens IBS symptoms. A diary of food intake and symptoms can be useful in identifying foods that exacerbate symptoms of IBS.⁴ However, most studies of dietary exclusion as a treatment of IBS have yielded negative results.² Because large meals can cause cramping and diarrhea in those with IBS, eating smaller meals more often or eating smaller portions may help to ease symptoms. Avoidance of foods that tend to produce gas is also recommended.

Increased dietary fiber may lessen IBS symptoms in many cases.^{2,5} Dietary fiber has a normalizing effect on bowel transit time and may help to modify abnormal colonic motility. While clinical trials have failed to consistently document a therapeutic benefit of fiber supplementation in the IBS population as a whole, constipation-predominant IBS patients are more likely to benefit.² To improve tolerance, it is best to add small amounts of dietary fiber to the diet (5 g/day) and gradually increase the amount to 25-30 g/day.

SYMPTOM-RELIEVING HERBS

Due to the complexity of the pathophysiology of IBS, as well as the potential debilitating nature of the symptoms, the following herbal recommendations for IBS focus on relieving symptoms. For example, herbs such as peppermint and chamomile can provide significant relief to IBS patients through their potent antispasmodic properties, which help to reduce the cramping and pain associated with IBS. Furthermore, because of the significant role that stress appears to play in the pathophysiology of IBS, herbs such as lavender and lemon balm are recommended for their ability to reduce stress and promote relaxation.

PEPPERMINT OIL

Evidence of the medicinal use of peppermint dates back thousands of years to the ancient Egyptians.^{9,10} First described in England in 1696, peppermint (*Mentha piperita*) is a hybrid cultivated throughout Asia, Europe, and North America.⁹ However, 75% of the world's fresh supply is grown in the U.S.¹¹ Peppermint oil is obtained by steam distillation of the fresh aerial parts of the flowering plant.¹²

Peppermint has been used since ancient times as a digestive aid and carminative (relief of flatulence).¹³ Today, it is considered an important component to be included in a natural therapeutic approach to IBS. The active constituent of the oil is menthol, a cyclic monoterpene with calcium channel blocking activity that comprises at least 45% of the total material present in commercially available preparations.^{10-12,14,15} Numerous other constituents are known to be present in the natural oil, including esters, such as menthyl acetate, which is responsible for the familiar minty taste and aroma of peppermint.

Mechanisms of Action

Peppermint is probably best known for its ability to suppress the symptoms of indigestion; hence, the common practice of eating mints following a meal. Peppermint oil has marked carminative and antispasmodic properties and thus may help reduce symptoms associated with IBS.¹⁴ It has been shown to relax intestinal smooth muscle in animals and humans by interfering with the availability of the calcium required for contraction by acting as a calcium channel blocker.¹⁴ The relaxation effect of peppermint oil is so pronounced that it is used during colonoscopy and barium enema exams for its ability to reduce colonic spasms.

Due to its antispasmodic property, peppermint helps in restoring the normal tone of intestinal muscle, thus reducing spasms and consequent abdominal pain.^{11,14} The beneficial carminative effects of peppermint have been linked to expulsion of intestinal gas, possibly via the breakdown of excess intestinal foam in the GI lumen.¹⁶ Research has shown that peppermint oil relieves symptoms of dyspepsia, stimulates the flow of bile, and inhibits microorganisms that may cause digestive problems.^{10,16}

Menthol and other constituents of peppermint oil are fat soluble and therefore rapidly absorbed.¹³ Because the action of peppermint oil occurs almost exclusively on a local basis, the preferred method of delivery is via enteric-coated capsules that release the oil in the intestine.^{13,15,16} Preventing the release of oil in the stomach also reduces or eliminates the occurrence of common side effects, such as esophageal reflux and heartburn secondary to relaxation of the esophageal sphincter.¹⁵

Clinical Studies

Several clinical studies have shown beneficial effects of peppermint oil in relieving symptoms of IBS, although results have been variable. In 1979, a double-blind, crossover trial evaluated the effectiveness of peppermint oil in 16 IBS patients.¹⁷ Over treatment periods of 3 weeks each, patients were given 1-2 capsules of peppermint oil 3 times daily (0.2 ml/capsule) or placebo. Patients reported that they felt significantly better while taking the peppermint oil and considered peppermint oil better than placebo in relieving abdominal symptoms. These results were confirmed by Dew et al. in another multicenter, crossover trial of 29 IBS patients conducted in 1984.¹⁸

A larger, more recent trial evaluated the effectiveness of peppermint oil in 110 outpatients with symptoms of IBS.¹³ In this randomized, double-blind, placebo-controlled study, patients were given 1 enteric coated capsule (187 mg) of peppermint oil or placebo 3-4 times daily (15-30 min before meals) for 1 month. Symptom improvement, such as reduced abdominal pain and distension, decreased stool frequency, and less flatulence, was significantly greater in the peppermint oil group than in the placebo group. Improvement usually occurred in the first 2 weeks and then stabilized. No significant side effects were reported.

A metaanalysis of 5 placebo-controlled, double-blind trials of extracts of peppermint as a symptomatic treatment for IBS was conducted.¹² Three of the trials demonstrated a significant difference between peppermint oil and placebo, while 2 of the trials did not. The authors of the study concluded, "Overall, this metaanalysis suggests a significant ($p < 0.001$) positive effect of peppermint oil compared with placebo in the symptomatic treatment of IBS." However, the researchers did caution that further studies are needed to clarify the role of peppermint oil in IBS.

A recent randomized, double-blind, placebo controlled trial published in the *Journal of Pediatrics* evaluated the efficacy and clinical usefulness of peppermint oil in the treatment of IBS symptoms in children.¹⁰ A total of 42 children with IBS were given 1-2 peppermint oil or placebo capsules 3 times daily, depending on the weight of the child. The peppermint oil was delivered in pH-dependent, enteric-coated capsules (187 mg/capsule) that resist disintegration and release until they pass through the stomach and encounter a pH of 6.8 or higher. After 2 weeks, 75% of those receiving peppermint oil had reduced

severity of pain associated with IBS, compared with only 19% in the placebo group.

LAVENDER OIL

Lavender (*Lavendula angustifolia*) is an evergreen shrub that is extensively cultivated for its flowers, which are gathered just before they are fully open. Lavender flowers contain at least 1.5% essential oil, which is produced by steam distillation. The chief constituents of the oil are linalool, linalyl acetate, camphor, β -ocimene, and cineol.⁹ The volatile oil is used in perfumes, foods, and in folk medicine.

Traditionally, lavender is used as a spasmolytic, carminative, stomachic, and diuretic; or, to put it more simply, to "comfort the stomach."¹⁹ According to the German Commission E Monographs, lavender oil is used orally for restlessness, insomnia, and functional abdominal complaints (nervous stomach irritations, nervous intestinal discomfort).²⁰ Lavender is also used in aromatherapy and topically to induce relaxation and relieve a variety of complaints, and is frequently included as a component of calming teas.

Lavender preparations and constituents seem to have several pharmacological effects in vitro and in animals.^{9,19} The volatile oils exhibit central nervous system depressant activity that results in improved sleep, decreased anxiety, and improvement in mood.⁹ A study of the antianxiety-like effect of certain essential oils in mice indicated that lavender oil exhibited a significant anti-conflict effect in a dose-dependent manner similar to the anxiolytic, benzodiazepine.²¹ Animal studies indicate that lavender has spasmolytic effects on smooth muscle and might have analgesic effects.^{19,22} The mode of action of linalool, one of lavender's major components, reflected that of the whole oil.

CHAMOMILE EXTRACT

Chamomile (*Matricaria recutita*) is one of the oldest favorites among garden herbs, and its reputation as a medicinal plant shows little sign of abatement. The fresh plant is strongly aromatic, with a distinct scent of apples. Chamomile is cultivated worldwide for its anxiolytic, spasmolytic, carminative, and anti-inflammatory properties.²³ While the whole plant is aromatic, the flower heads are the part used medicinally.

Chamomile contains two main fractions: volatile oils (bisabolol, matricine) and flavonoids (apigenin, apigenin-7-glucoside, luteolin, quercetin).²⁴ Animal studies support chamomile's traditional use as an antispasmodic and anxiolytic (anti-anxiety) agent, although the active components have not yet been fully characterized.²³ It has been demonstrated that apigenin exerts anxiolytic and mild sedative effects in mice and relaxes intestinal spasms. While it has been reported that apigenin functions by binding the central benzodiazepine receptors, more recent research indicates that the sedative effect of chamomile may be ascribed to other components.²⁵

Because chamomile is noted for its treatment of inflammatory diseases of the skin and intestinal tract, researchers have attempted to elucidate the mechanism of action. One in vitro study demonstrated that chamazulene, a transformation product of the constituent matricine, contributes to the anti-inflammatory activity of chamomile by causing a concentration-dependent inhibition of leukotriene B₄ synthesis and additional antioxidative effects.²⁶ The components apigenin and bisabolol have also demonstrated an ability to interfere with 5-lipoxygenase and cyclooxygenase production.

LEMON BALM

The dried leaves of lemon balm (*Melissa officinalis*) are used for promoting digestion, as a mild tranquilizer, for stimulating appetite, as an antispasmodic, and for functional GI disorders with distention and gas.⁹ Emitting a fragrant lemony odor when bruised, the leaves contain at least 0.05% volatile oil whose main components are citronellal, geraniol, and neral. Lemon balm oil is produced by steam distillation from fresh or dried leaves at the start of or during the flowering period. Research has shown that the herb has sedative, carminative, antispasmodic, antibacterial, and antiviral activities.^{9,20} Therefore, lemon balm not only may help to relieve IBS symptoms and reduce stress, but may also help to promote a healthy intestinal environment.

PROBIOTIC SUPPORT

The intestinal microflora environment significantly influences the biochemistry, physiology, immunology, and disease resistance of the host. Intestinal disorders such as IBD, Crohn's disease, and colitis have long been associated with an imbalance of the gut flora, or pathogenic overgrowth (dysbiosis).²⁷ While the symptoms of IBS are generally associated with altered colonic motility and visceral hypersensitivity, a role for the intestinal flora and/or intestinal infections and inflammation has also been proposed.²⁷⁻³⁰ If dysbiosis is a factor, reinoculation with probiotics such as *Lactobacillus acidophilus* and *Bifidobacterium infantis* can help restore healthy gut ecology and function, and thus may offer an effective therapy in the treatment of IBS.

A small number of studies have assessed the potential efficacy of various probiotic strains in influencing IBS. In a recent double-blind, placebo-controlled study of 60 IBS patients, one group received *Lactobacillus plantarum* supplementation while the other group received a placebo for 4 weeks.²⁸ The results indicated that the probiotic-supplemented group experienced decreased pain and flatulence, although the placebo group showed improvement as well. Another double-blind, placebo-controlled study, utilizing a cross-over design, evaluated the benefits of an *L. acidophilus* supplement in 18 patients with IBS.²⁹ Fifty percent of the subjects experienced a statistically significant therapeutic benefit during the 6-week probiotic phase of the study as compared with the 6-week placebo phase.

In another recent study, 13 IBS patients (diagnosed by Rome criteria) were treated in a community based GI practice to determine if their IBS symptoms would improve following probiotic supplementation.³⁰ The patients in the open label retrospective study were given *L. acidophilus* NCFM®, *B. infantis*, and fructooligosaccharides for one month. Based on stool analysis results, antimicrobials were given to 7 patients in addition to the probiotics for one week. Patients were evaluated at baseline and 4 to 6 weeks after treatment using the IBS Quality of Life (IBS-QOL) validated instrument and the Symptom Frequency Index (SFI). The IBS-QOL score averaged 60.2 at baseline and increased to 83.8 after treatment, indicating a significant ($p < 0.001$) improvement in quality of life. The SFI at baseline averaged 41.8 and all patients experienced a decreased SFI after treatment, with an average decrease of 21.5 ($p < 0.001$). These results suggest a possible long-term benefit of the use of probiotics in relieving symptoms in those IBS patients with an imbalanced gut flora.

A key element in the therapeutic approach to patients with intestinal dysfunction such as IBS is the 4R program of *Remove, Replace,*

Reinoculate, and *Regenerate.* For a complete discussion of this program, please refer to the Applied Nutritional Science Report: *Gut Dysfunction and Chronic Disease: The Benefits of Applying the 4R GI Restoration Program.*³¹

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