

**Irritable Bowel Syndrome:
Diagnosis, Causes, and
Treatments**

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Abstract

Irritable Bowel Syndrome (IBS) is a common gastrointestinal disorder suffered by many Americans. The syndrome lacks the presence of any characteristic biological markers. The exact pathophysiology is still unknown, however there are many theories as to what the underlying cause is. Possible causes include neurologic dysfunction, psychiatric causes, post-infectious, and diet. Diagnosis of the syndrome is symptom based. Three classifications are widely used by epidemiologists: the Manning, ROME I, and ROME II Criteria. Although there is no exact treatment or remedy for the syndrome, various pharmaceuticals exist. However, their effectiveness is questionable and may lead to negative side effects. There are also numerous homeopathic methods used to treat IBS, but many lack the research and standardized testing needed to confirm their effectiveness. Treatment for IBS should be on an individual basis and aimed at the most predominant symptom. It should also reduce abdominal discomfort and increase the overall satisfaction of the patient.

Key Words: spastic colitis, spastic colon, mucus colitis, nervous stomach, nervous diarrhea, and functional bowel disease.

Introduction

Irritable Bowel Syndrome (IBS) is a condition that is gaining more and more prevalence in the American population. A number of terms are used to describe IBS, including spastic colon, spastic colitis mucous colitis, nervous stomach, nervous diarrhea, and functional bowel disease. For simplicity and clarity, the syndrome will be referred to as IBS throughout this discussion.

There is still much of IBS to be understood. Diagnosis of the syndrome is still based on a variety of symptoms and diagnostic criteria such as the Manning, ROME I, and ROME II criteria. Although no structural lesions or absolute pathophysiological cause has been identified, possible causes of IBS may be linked to what is known as the Brain-Gut-Axis, psychological factors, post-infectious causes, and dietary factors. There are a number of methods used to treat IBS, but not one treatment is the cure for all patients. Treatment sometimes seems to be more of a trial and error method to determine what method works best for an individual. Some patients respond well to pharmaceutical agents, and others might respond to natural remedies. Still other individuals suffering from IBS don't respond to any of the proposed treatments.

As mentioned before, IBS affects a significant portion of the American population, and is a common complaint of the gastrointestinal system. An enormous amount of money is spent annually on direct and indirect costs of treatment for IBS. Although IBS is so common in American society, a telephone survey revealed that many Americans don't know what IBS is and even more are unaware of the economic and social impacts (14).

In the following discussion, the epidemiology, economics, diagnosis, possible causes, and treatments of IBS will be reviewed in attempt to bring some clarity to this vague syndrome.

Discussion

Before discussing the diagnosis, causes, and treatments available for IBS, it is appropriate to discuss some general background information. First, a simple definition of IBS must be understood. IBS is a chronic disorder of the gastrointestinal tract characterized by abdominal pain, discomfort, or both. The pain and discomfort is associated with defecation and altered bowel habits. IBS does not cause inflammation, permanent harm, or progress to more serious conditions. The syndrome lacks a biological marker, and no structural, biochemical, or physiological abnormalities are consistently demonstrated (1,2,6,7,10,12,13).

There are numerous symptoms associated with IBS. These may include diarrhea, constipation, alternating diarrhea and constipation, excessive gas, belching, abdominal pain, bloating, soft stools, mucus in the stool, and pain that resolves with a bowel movement. Severity of these symptoms may vary from mild and annoying in some, to severe and disabling in others. Some symptoms may be severe enough to alter daily activities and performance (2,4,5,6).

Irritable Bowel Syndrome has been found to be as common in the American population as those in Asian and European countries (2). However, IBS seems to be five times more prevalent in Caucasians than African Americans (1). IBS affects anywhere between 5-25% of the population and the prevalence is 3-4 times greater in females than males (1,2,3,4,5,11,12,13). 70-75% of those that suffer from IBS are women. This may possibly be due to the fact that women are more likely to seek medical attention, and

women have a slower whole gut transit time resulting in greater reports of less frequent stools, and constipation (3,8).

IBS can affect people at any age, however prevalence decreases with age. 50% of patients have symptoms before age 35, and it is usually not diagnosed after age 60 when organic disease becomes more common (2,1).

IBS is one of the most common clinical problems encountered by general practitioners and gastroenterologists (2,10). It leads to almost two million prescriptions per year in the U.S. and is the most common cause of industrial absenteeism due to illness (3,4). Many patients that suffer from IBS report a significant decrease in quality of life (13).

As mentioned previously, many Americans don't realize the economic impact of IBS. In fact, IBS has a substantial economic impact. It is estimated that the U.S. spends \$1.3-\$1.6 billion annually in direct costs and \$19.2 billion in indirect costs (2,9). It is estimated that the total annual cost (direct and indirect) of IBS in the U.S. is approximately \$30 billion, with an estimated \$2078 per patient per year (9,11). IBS symptoms lead to an increase in absenteeism and loss of job productivity. Total annual productivity losses for the U.S. are estimated at \$205 million (9,13).

Even though much of the American population does not realize the economic impact or understand exactly what IBS is, another challenge arises when clinicians attempt to diagnose the syndrome.

IBS is a diagnosis of exclusion rather than a primary diagnosis. There are no structural, biochemical, or physiologic abnormalities that accompany the disorder.

Furthermore, there are no laboratory tests or physical markers that are pathogomonic for IBS (2,11,15).

It is believed that IBS can be confidently diagnosed by identifying typical symptoms, performing a complete physical exam, and excluding alarm features. A careful interpretation of pain and/or discomfort and stool characteristics is essential in IBS diagnosis. It should also be mentioned that exhaustive testing to exclude organic gastrointestinal disease in those with out alarm features in not supported by evidence (2,15,20).

There are characteristics, or supportive, symptoms associated with IBS. Below is a list of supportive symptoms and other less commonly experienced symptoms by those with IBS (1,2,4,26).

Supportive Symptoms of IBS

1. fewer than 3 bowel movements per week
2. greater that 3 bowel movements per day
3. hard or lumpy stools
4. loose or watery stools
5. straining during a bowel movement
6. urgency (having to rush to have a bowel movement)
7. feeling of incomplete bowel movement
8. passing mucus in stool
9. abdominal fullness, bloating, or swelling

Other Symptoms Experienced by Patients with IBS

- heart burn
- back pain
- head ache
- urinary frequency
- muscle pains
- menorrhagia
- dyspareunia
- anxiety
- depression
- painful intercourse

There are signs and symptoms that aren't typical of IBS, and might suggest the presence of organic disease. Below is a list of potential Red Flag, or alarm features, that do not typically present in patients with IBS (4,11,113,15,16,26)

Red Flag/Alarm Features

- symptom onset after age 50
- severe, unrelenting diarrhea
- nocturnal symptoms
- haematochezea
- family history of organic GI disease such as IBD, celiac sprue, or malignancy
- anemia
- persistent features

Along with the supporting symptoms and Red Flags, three criteria have been developed to assist with the diagnosis of IBS. These consist of the Manning Criteria, ROME I Criteria, and ROME II Criteria. The ROME I Criteria has been further subdivided into diarrhea-predominant IBS, constipation-predominant IBS, and alternating constipation-diarrhea IBS. These three criteria will be discussed individually.

The Manning Criteria was established in 1978. This system consists of symptoms including abdominal pain relieved by defecation, looser stools with the onset of pain, more frequent stools with the onset of pain, abdominal distension, passage of mucus in stools, and a sensation of incomplete evacuation (1,13,26).

The ROME I Criteria and ROME II criteria are summarized in the following tables (4,8,13,20).

ROME I Criteria

Constipation-Predominant IBS (must have all three)

1. Abdominal pain or discomfort that is
 - relieved by defecation, or
 - associated with a change in stool frequency, or
 - associated with a change in stool consistency
2. Less than 3 bowel movements per week on at least one quarter of occasions
3. Hard or lumpy stools on at least one quarter of occasions

Other Common Complaints

- infrequent bowel movements
- hard or lumpy stools
- sensation of incomplete evacuation
- excessive straining with loose or watery stools unless laxatives are taken

Diarrhea-Predominant IBS (must have all 3)

1. Abdominal pain or discomfort that is
 - relieved by defecation, or
 - associated with a change in stool frequency, or
 - associated with a change in stool consistency
2. Greater than 3 bowel movements per day on at least one quarter of occasions
3. Loose or watery stools on at least one quarter of occasions

Other Common Symptoms

- frequent bowel movements
- loose or watery stools
- urgency for a bowel movement

Alternating Constipation-Diarrhea IBS

-must have one of the two following criteria:

1. meets above criteria for both constipation-predominant and diarrhea-predominant IBS
2. meets above criteria for neither constipation-predominant IBS or diarrhea-predominant IBS

Alternating constipation-diarrhea IBS is thought to be the most common of the three. These patients have irregular bowel patterns that alternate between constipation and diarrhea, and the stool consistency may be very erratic. Approximately 30% of patients have diarrhea-predominant IBS and 20% of patients have constipation-predominant IBS. Furthermore, patients with constipation-predominant IBS frequently have more musculoskeletal symptoms, dyspepsia associated symptoms, and alterations in vital functions such as poor sleep, loss of appetite, and sexual dysfunction than those that suffer from diarrhea-predominant IBS (4,20).

ROME II Criteria

At least 12 weeks or more, which need not be consecutive, in the preceding 12 months of abdominal discomfort or pain that is accompanied by at least two of the following features:

1. pain/discomfort relieved by defecation, and/or
2. onset is associated with a change in frequency of stool, and/or
3. onset is associated with a change in form (appearance) of stool.

Other symptoms associated with IBS

- Abnormal stool frequency
- Abnormal stool form
- Abnormal stool passage
- Passage of mucus
- Bloating or feeling of abdominal distension

These three criteria are useful for the diagnosis of IBS in research studies by experts. They are used in epidemiologic studies to ensure appropriate enrollment of IBS patients in trials of therapy. However, the usefulness of these criteria in a clinical setting is uncertain. Because of this and the varied symptoms experienced by patients with IBS, it has been proposed that clinicians use a broad definition to describe IBS: abdominal discomfort associated with altered bowel habits (13,18).

Another issue that presents itself in the diagnosis of IBS is the use of diagnostic tests. It has been determined that routine performance of diagnostic tests in patients with suspected IBS with out alarm features is not supported by literature. So far, no test has been established as a diagnostic standard for IBS, and there is currently no specific treatment available that relies on the result of any diagnostic procedure. Diseases that have been of greatest concern in patients with symptoms suggestive to IBS include Inflammatory Bowel Disease, colorectal cancer, systemic hormonal disturbances, enteric infection, and malabsorptive diseases. Some diagnostic tests that may be considered if organic causes are suspected are CBC, ESR, serum chemistries, stool culture, colonic visualization, barium enema, and colonoscopy (13,15,20).

Like the diagnosis of IBS, the exact cause of the syndrome is not cut in stone. In fact, no precise underlying pathophysiology can be determined. As noted before, no physiological or psychosocial markers have been identified. However, several predisposing, precipitating, and perpetuating factors of IBS have been identified to contribute to the expression and exacerbation of IBS symptoms (1,2,3,4,11,19). Some theories proposed to be the cause of IBS include neurological, psychological, post-infectious, and dietary.

The gastrointestinal tract is controlled by the enteric nervous system (ENS) independently, but is also monitored and modified by the sympathetic and parasympathetic nervous systems. This bidirectional pathway between the ENS and CNS is known as the Brain-Gut-Axis. Dysregulation of this bidirectional system can alter intestinal motility and cause increased visceral sensitivity (2,4).

Hyperactive CNS pathways that cause increased sensitivity are also thought to be caused by an increase in the number of nociceptors in the abdomen, or overactive nociceptors in the spinal cord that lowers visceral pain thresholds (2,4,6).

Hyperactivity of the ENS can also affect gastrointestinal motility. Motility disturbances can cause abdominal pain, diarrhea, and constipation. Studies have identified abnormal patterns of contractile and electrical activity in the colons of patients diagnosed with IBS. These abnormal patterns may contribute to altered GI motility (2,4,9).

Another aspect to consider when determining the cause of IBS is the individual's psychological state. There is a confirmed association between anxiety and depression and IBS. Research frequently shows a history of emotional, physical, or sexual abuse in

women with IBS. Studies also show a prevalence of comorbid psychiatric diagnosis in IBS patients to be 42-61% (2,4,12,19).

The clinical expressions of IBS symptoms are strongly influenced by psychosocial factors, and in many patients, social stress may cause an exacerbation of symptoms. At the same time, some patients with IBS suffer a reduction in quality of life that causes psychological conditions (2,3). Because of this, it is uncertain if psychological factors cause IBS, or if IBS symptoms trigger psychological conditions such as depression, due to a reduction in quality of life and general well-being.

Another possible cause for IBS is post-infectious IBS. Recent studies report that 25% of people with IBS developed symptoms after an episode of gastroenteritis or acute infection. There is a well documented relationship between enteric infection and alteration in gut function. The most common causes of gastroenteritis are Salmonella and Campylobacter. Studies have also shown that in the year after infection, patients were ten times more likely to have IBS symptoms. The greatest predicted value for development of symptoms is stressful life events prior to and three months after the infection appeared (1,2,4,19).

Risk Factors for Post-infectious IBS

- female
- severe and prolonged acute gastroenteritis
- presence of significant psychological disturbance around time of infection
- depression

Diet has also been thought to contribute to symptoms of IBS. Following are different types of substances that may contribute to or exacerbate symptoms in patients that suffer from IBS.

Refined sugar. A study comparing a diet of 165 grams of refined sugar per day to a diet of 60 grams of refined sugar per day showed a significant prolonged mouth-to-anus time indicating a tendency to produce constipation (1).

Fructose and Sorbitol. Studies showed that ingestion of these caused marked abdominal stress in IBS patients. This suggests that the pronounced GI stress may be provoked by incomplete or improper absorption of small amounts of fructose and sorbitol (1,4)

Fat. IBS patients react to extremely fatty meals. This reaction is more pronounced in patients with diarrhea as the major symptom. High fat meals cause an increase in frequency of watery stool, cramping, and can also trigger bloating and diarrhea (1,4).

Caffeine. Caffeine acts as a stimulant to the nervous system and can contribute to cramping and diarrhea. It can also aggravate anxiety causing IBS symptoms to be more severe (4)

Alcohol. Alcohol may cause cramping, diarrhea, dyspepsia, and can disrupt sleep contributing to nervous system imbalances (4). Nervous system imbalances can alter gut motility and sensitivity thus contributing to or exacerbating symptoms

Raffinose. Raffinose is a complex carbohydrate that is incompletely absorbed. Foods high in raffinose include beans, cabbage, brussel sprouts, broccoli, and asparagus (4). Incomplete absorption may contribute to GI irritability and alter sensitivity and motility.

Wheat. Some people have an intolerance to wheat causing cramping, distention, bloating, flatulence, or diarrhea (4). Wheat may be an aggravating factor in those who have been diagnosed with IBS. This may contribute to IBS like symptoms.

As there are many different possible causes of IBS, there are many different possible treatments as well. Some patients respond to various pharmaceutical agents and others may respond to various alternative treatments instead. There is no individual treatment for IBS that works for all patients. Therefore, treatment must be determined on an individual basis.

The first step in developing a treatment for IBS is a positive physician-patient relationship. Treatment should be offered if the patient and physician believe that the IBS symptoms diminish the quality of life. Fortunately, no mortality is associated with the syndrome, and as mentioned previously, IBS does not cause permanent damage to the GI tract or progress to more serious conditions. It does, however, cause substantial morbidity resulting in decreased global well-being and enormous loss of productivity. Therefore, therapy is based on the dominant symptom. International guidelines state that treatment should reduce abdominal discomfort and increase overall satisfaction (2,4,13,22,24,29).

Tegaserod (Zelnorm). Tegaserod is indicated in women with IBS whose primary symptom is constipation. The efficacy in men and those with alternating bowel habits are not established. Tegaserod stimulates the parastaltic reflex and appears to affect the entire length of the GI tract. It should provide an improvement in pain and bowel dysfunction, global well-being, bloating, and constipation (2,4,13,16,22,23,25,27). Side effects of Tegaserod include mild diarrhea, severe diarrhea, and can be complicated by hypovolemia, hypotension, and syncope (13,16,23,29).

Alosetron. Alosetron is indicated in women with diarrhea predominant IBS with symptoms present for at least six months and who have failed to respond to conventional therapy. It was FDA approved in 2000, but withdrawn because of its adverse effects including death. The FDA reapproved the drug under severe restrictions resulting in an unlikely treatment option for many patients. Alosetron slows colonic transit and enhances colonic compliance. It also reduces colonic sensation during volume distensions. The drug has been shown to relieve pain, discomfort, urgency, and diarrhea. Some trials showed improvement in health related quality of life and work absenteeism. The most common side effect is constipation, but ischemic colitis has been associated with it. (2,4,11,13,16,24,27,29)

Loperamide. Loperamide, brand name Imodium, is an opioid agonist. It is indicated for those with diarrhea as the predominant symptom. It reduces urgency and frequency of bowel movements and decreases intestinal transit time. Loperamide can also increase stool consistency and strengthen sphincter tone. It is usually preferred over the other opiodes because it doesn't cross the blood brain barrier. Loperamide has not been shown to relieve pain and has no effect on global symptoms (4,11,13,21,29).

Antispasmodics. There are two types of antispasmodics. The first type directly affects intestinal smooth muscle. These include mebeverine, pinaverne and are not available in the U.S. The second type works by blocking the effects of the parasympathetic branch of the autonomic nervous system. These include dicyclomine and hyoscyamine. Antispasmodics are thought to decrease spontaneous activity of smooth muscle. They have shown a reduction in pain in patients with pain as the main symptom.

These drugs have been shown to increase or cause constipation and at high doses, visual disturbances, urinary retention, and dry mouth have occurred (4,11,13,29).

Antidepressant Drugs. The use of antidepressant drugs for the treatment of IBS is growing. They are typically reserved for patients with diarrhea-predominant IBS and pain. They are also used when symptoms become repetitive and severe or are associated with an altered quality of life. Tricyclic agents, amitriptyline and imipramine, are frequently used for patients with impaired daily function and associated depression or panic attacks. Some studies show a reduction in pain, but its effectiveness has not been validated. Constipation and drowsiness are associated with usage of these drugs (4,11,13,16,21,29)

Analgesic Drugs. There are two types of analgesic drugs: non-narcotic analgesics and narcotic analgesics. Non-narcotic analgesics include aspirin, acetaminophen, and NSAIDS. These have shown to provide little relief of IBS symptoms. Narcotic analgesics, codeine, are usually not prescribed for long-term usage because of possible physical dependency or addiction. They are used occasionally to relieve intermittent attacks of severe pain. However, continuous use of narcotics may actually increase pain sensitivity and alter gut motility resulting in constipation and exacerbation of initial symptoms. Other side effects of narcotics include sedation and drowsiness (4).

Laxatives. There are two types of laxatives: osmotic and stimulant. Most osmotic laxatives are available only by prescription and may be used on a daily basis. These drugs are not absorbed by the GI tract and they soften stool. They usually take one to three days to work. Stimulant laxatives are available over the counter. They shouldn't be used more than two or three times per week. They usually take between six to twelve hours to work.

Stimulant laxatives interfere with absorption and motility and produce a soft to semi-fluid stool (4).

Bulking Agents. Fiber is necessary to promote normal peristalsis. As it passes through the intestines, fiber absorbs water. This softens and increases stool bulk making elimination easier. The more bulk stool has, the lower intestinal pressure is. Muscles don't have to contract as strong to pass stool through the intestines. The increase in stool bulk and reduction of muscle contraction may lead to a reduction in pain. Fiber might benefit some patients with diarrhea-predominant IBS because it absorbs excess water from the stool and increases consistency. Fiber may also provide some relief to those suffering from constipation possibly by accelerating colonic transit time. Some fiber supplements to consider are psyllium, methylcellulose, calcium polycarbophyl, flaxseed, and bran (4,13,17,21,19).

Diet. An elimination diet may be tried to determine foods that might trigger or exacerbate IBS symptoms. This approach requires elimination of most food from the diet initially while maintaining a careful, accurate food diary. Gradual reintroduction back into the diet one food at a time is performed while observations and records of any reactions are kept. Removal of known food allergies or intolerances as well as a low fat diet may help to reduce some symptoms of IBS (4).

Herbal Remedies. Acidophilus is a probiotic consisting of live bacteria that are considered beneficial to the GI. These bacteria can be found in yogurt, acidophilus milk, or supplement form. Acidophilus is recommended for IBS with diarrhea as the main symptom. (4). Chamomile, peppermint, and Triphala are a few other herbal supplements that might prove beneficial in the treatment of IBS (4).

Chiropractic. Although there have been no well designed studies to evaluate the effects of chiropractic and IBS, some chiropractors report that adjustments may improve symptoms in some individuals because it balances the nerves that innervate the GI tract (28). This could possibly regulate intestinal motility and decrease pain.

Acupuncture. Acupuncture is an ancient Chinese medical procedure involving the insertion and manipulation of needles into the skin at more than 360 points on the body. Acupuncture stimulates the nerves that go to skin and muscles. The perception of pain signals is modified due to an increase in endorphins and serotonin. Some acupuncturists notice a reduction in pain and an improved sense of well-being in their patients, however, no firm conclusion can be made until large clinical trials are conducted (1,28).

Applied Kinesiology. Applied kinesiology (AK) uses muscle testing that detects imbalances in body systems and sensitivities to food and toxic substances. Food and chemical sensitivities can cause muscle weakening because of alterations that occur in the body's electric field. This approach may be a possible treatment, but no specific research is available about AK and IBS (1).

Conclusion

Although the effectiveness of many drugs and other remedies used to treat IBS is questionable, they are still used by many to relieve some of the symptoms that patients suffer from. It is up to the clinician and patient to determine an individual method of treatment that provides for the safest and most effective relief.

IBS is a broad syndrome with many various symptoms that present differently in each individual. The general population is not aware of the impact of this syndrome because many lack the knowledge of what IBS truly is. There is no physiological or biological marker to indicate a firm diagnosis of IBS. Therefore, the syndrome is a diagnosis of positive symptom identification. The underlying pathophysiology is unclear even to experts. It appears that many contributing factors can lead to the symptoms of IBS. Treatment should be based on the dominant symptom, and only when symptoms are so severe that they diminish quality of life. Many pharmaceuticals are available, but their effectiveness is questionable, and can cause unwanted side effects. Natural remedies might show good results, but they lack the needed controlled trials to confirm their effectiveness.

Once a physician has reached the diagnosis of IBS, he/she is responsible for educating the patient about the syndrome. The patient should actively participate with the physician in developing a treatment plan that is customized to meet the individual needs of that patient. The treatment of IBS should always focus on improving global well-being by providing the maximum amount of symptom relief with the least occurrence of negative side-effects.

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