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Diagnosis, Pathophysiology and Treatment of Irritable Bowel Syndrome: A Review

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ABSTRACT:

Worldwide, 10–24% of people suffer with irritable bowel syndrome (IBS), a persistent and crippling functional gastrointestinal illness. In primary care workplaces, the proportion of patients seeking treatment for IBS exceeds 12%, and in gastrointestinal clinics, this category is by far the largest. It is often known that compared to people without this diagnosis, these patients have a lower quality of life and make more use of the healthcare systemIBS's pathogenesis is not clear. The precise cause of IBS remains unknown despite the many possibilities that have been proposed. The three main subtypes of IBS are (1) IBS with constipation (IBS-C), (2) IBS with diarrhea (IBS-D), and (3) mixed IBS (IBS-M). The updated ROME III criteria classify IBS as a clinical diagnostic; IBS-M was formerly referred to as alternating IBS (IBS-A). Patients may appear with different symptoms across IBS subtypes, and those symptoms may evolve over time. Patients list abdominal discomfort, straining, myalgias, urgency, bloating, and a sense of serious sickness as the most upsetting symptoms. Treatment for IBS is challenging due to its complexity and variability.

Reviews and guidelines exist for the treatment of IBS, however they mostly highlight high-priority endpoints and the effectiveness of drugs for IBS symptoms, mainly ignoring lower-priority endpoints. In order to assist physicians in identifying and treating their patients, the goal of this study is to present an extensive evidence-based summary of the diagnosis, pathophysiology and treatment.

Introduction

IBS Worldwide, 10%–24% of people suffer from irritable bowel syndrome, a persistent and crippling functional gastrointestinal condition (World Gastroenterology Organization, 2009). In the absence of obvious anatomical and biochemical abnormalities, irritable bowel syndrome (IBS) is a gastrointestinal (GI) condition marked by changed bowel habits associated with abdominal discomfort or pain (Drossman DA *et al*,2006). According to Cumming, a person may experience constipation or laxity in their bowel movements at different times. I don't claim to know how the illness may have two symptoms that are so dissimilar"(Horwitz BJ& Fisher RS,2001). IBS is a common functional bowel illness that is classified as a gastrointestinal disorder. It can significantly reduce quality of life and create a considerable health care cost. In terms of aetiology, numerous aspects are involved. Understanding the pathophysiology of IBS is crucial since pharmaceutical companies are starting to target the illnesses established pathophysiologic processes (Occhipinti K, & Smith JW,2012). The pathophysiology of IBS has been linked to altered fecal microflora, bacterial overgrowth, food sensitivity, brain-gut interactions, gastrointestinal motility, post-infectious reactivity,visceral hypersensitivity, alteredfecal microflora, carbohydrate malabsorption, and intestinal inflammation (Occhipinti K, & Smith JW,2012). However, bloating, diarrhea, constipation, and

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stomach pain or discomfort are the symptoms that are thought to result from these mechanisms. Not every symptom is gastrointestinal; for example, weariness is frequently experienced.

Serotonin is a key regulator of the peristaltic reflex and sensory relays in the gut, and it is mostly found in the enterochromaffin cells of the gut (Talley NJ,2001). Serotonin (5-hydroxytryptamine, 5-HT) plays a significant role in the motility of the muscles of the intestine or gut. It is a key neurotransmitter in the enteric nervous system, and sometimes is referred to as the "second brain" due to its autonomy and complexity.

Regulation of Peristalsis: Serotonin is released by enterochromaffin cells in the gut lining in response to the presence of food. It binds to receptors on enteric neurons, stimulating the muscle contractions that propel food through the digestive tract in a process known as peristalsis.

Coordination of Muscle Contractions: Serotonin coordinates the contraction and relaxation of the circular and longitudinal muscles in the gut. It activates excitatory motor neurons that contract the muscle upstream of the food bolus and inhibitory motor neurons that relax the muscle downstream, facilitating the smooth movement of contents through the gut.

Sensory Signaling: Serotonin acts as a signalling molecule to relay information about the state of the gut lumen (e.g., presence of food, mechanical stretching) to the enteric nervous system and the central nervous system. This helps regulate digestive processes and gut motility based on the contents of the gut.

Gut-Brain Axis Communication: Serotonin is involved in the communication between the gut and the brain, influencing gut motility, secretion, and overall digestive function. Alterations in serotonin levels can impact this communication, potentially leading to gastrointestinal disorders.

Modulation of Secretion: In addition to its role in motility, serotonin stimulates the secretion of digestive juices and mucus, aiding in the digestive process and protecting the gut lining.

People with diarrhea-predominant IBS (IBS-D) and constipation-predominant IBS (IBS-C) appear to emit more serotonin in their plasma (Dunlop SP*et al*,2005). Both ulcerative colitis and IBS have been linked to abnormalities in serotonin signalling, as evidenced by a decrease in serotonin transporter immunoreactivity and normal mucosal serotonin levels (Coates MD*etal*,2004).

Some investigations have focused on the molecular level, using serotonin receptor agonists and antagonists. The importance of psychosocial aspects in IBS must also be considered, as they influence treatment options and patient expectations. First, psychological stress exacerbates gastrointestinal symptoms, increasing the intensity of diarrhea, abdominal discomfort, and so on.

Second, psychological and mental co morbidity is common among IBS patients. These psychological aspects influence IBS patients' sickness experiences, expectancies, and treatment outcomes. Finally, the AGA underlines that these factors influence which patients see doctors. All of these factors must be considered when developing long-term treatment goals, whether through medication or psychological management.

"Functional somatic syndromes" include chronic fatigue syndrome, fibromyalgia, and functional GI disorders (FGID), the most well-known of which are functional dyspepsia (FD) and irritable bowel syndrome (IBS) (Van Oudenhove L*et al*,2010). FGID disorders are common conditions for which the etiology is not well understood. Psychosocial factors are thought to have a predisposing, triggering, or perpetuating effect on GI sensorimotor function and/or symptom production in FGID; comorbidity with mental diseases, primarily mood or anxiety disorders, is common (Van Oudenhove L,*et al*,2010). The ways in which these psychosocial factors may affect GI function or symptomatology have been somewhat elucidated by research in psychophysiology, epidemiology, and functional brain imaging.

The "brain-gut axis" can be defined as the neuronal, neuroendocrine, and autonomic pathways that provide a bidirectional connection system between the brain (central nervous system) and the GI tract

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(with its enteric nervous system). Consequently, the GI tract itself or the modulatory input from the central nervous system via the brain-gut axis might be identified as the source of disruptions in gut function (Van OudenhoveL,*et al*,2010). In primary care premises, the proportion of patients seeking treatment for IBS exceeds 12%, and in gastrointestinal clinics, this category is by far the largest (Drossman DA *et al*,2002). These individuals have been shown to have a lower quality of life and to use the health care system more frequently (Whitehead WE *et al*,1996, &Drossman DA*etal*,1993). Compared to patients without IBS, those with IBS miss more workdays, utilize more diagnostic tests, take more medications, see the doctor more frequently, are hospitalized more frequently, and spend more money on direct medical expenses overall. In an attempt to help clinicians diagnose and treat their patients, some evidence-based etiology, diagnosis, and treatment will be provided here.

Physiopathology

IBS has historically been described as a syndrome of visceral hypersensitivity, characterized by constipation or diarrhea, as well as abdominal discomfort and pain (Drossman DA et al,2010, Talley NJ,& Spiller R,2002). Intestinal transit is altered as a result of the gastrointestinal motor disturbances (Talley NJ,& Spiller R, 2002). There is growing evidence that certain people who meet the Rome criteria for IBS can be recognized as having an organic disease of the gastrointestinal system. There is growing evidence for central dysregulation, bacterial overgrowth, serotonin dysregulation, and mild inflammatory bowel illness. Moreover, it appears likely that IBS has a hereditary component (Drossman DA *et al* ,2000).

Immune stimulation and infection in IBS

According to prospective research, the exact incidence of persistent new IBS symptoms varies depending on the pathogen, however it has been shown that 5%–40% of enteric infections cause them. Long-lasting IBS is the result of bacterial enteritis, protozoan and helminth infections, while viral gastroenteritis appears to have only transient effects. The following are risk factors for developing IBS-PI in order of significance: smoking, female gender, depression, hypochondriasis, toxicity of the infecting bacterial strain, long-term initial sickness, mucosal signs of inflammation, and traumatic life experiences within the previous three months. Antibiotic treatment has been linked to an increased incidence of IBS-PI, while age greater than 60 may offer protection against the illness.

Although the exact causes of IBS-PI are unknown, potential causes include chronic inflammation or lingering alterations in enterochromaffin and mast cells, mucosal immunocytes, enteric neurons, and the gastrointestinal microbiota (Spiller R, &Garsed K,2009). Intestinal infection exposure results in a chronic low-grade systemic and mucosal inflammation that is typified in IBS patients by a changed circulating cell population, immune cell infiltration of the mucosa, and elevated production of several cytokines. By assessing the expression and activation of Toll-like receptors, recent research has also suggested that these patients have an enhanced innate immune response(Belmonte L, *et al*, 2012). These results imply that immunological activation might be a major factor in the pathophysiology of IBS. It has been documented that immunological activation can be induced by psychological stress.

Dysregulation of serotonin

Serotonin (5-Hydroxytryptamine, C10H12N2O) regulates gastrointestinal motility, sensation, and secretion in a unique way via the 5-HT3 and 5-HT4 receptors (Spiller RC,2001, Gershon MD ,1999 &De Ponti F,2004). Additional evidence supporting its role in the motor and sensory dysfunction linked to IBS is the finding that plasma 5-HT concentrations are lower in patients with constipation (De Ponti F,2004), but higher in those with diarrhea(Derbyshire SW,2003 &Houghton LA*et al*,2003), particularly in those exhibiting postprandial symptoms (Houghton LA*et al*,2003). Since agonists at the 5-HT4 receptor are predicted to enhance gastrointestinal propulsion, or prokinetics, and antagonists at the 5-HT3 receptor to slow gastrointestinal transit and reduce visceral sensation, there has been a great deal of interest in

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these receptors as potential therapeutic targets for IBS (Tack J*et al*,2006, McLaughlin J,& Houghton LA, 2006 & Degen L *et al*,2001)and antagonists at the 5-HT3 receptor to lessen visceral feeling and decrease gastrointestinal transit (Mayer EA, Bradesi S 2003, Houghton LA*et al*,2000, Delvaux M*et al*,1998).

Brain-gut interaction and central dysfunction

It's unclear if psychosocial factors have a direct impact on gastrointestinal function, although they seem to play a significant role in IBS. However, gastrointestinal disorders might alter central nervous systems. For instance, there is strong evidence now about maltreatment during childhood or adulthood. With IBS, anxiety, stress, and depression are also prevalent (Talley NJ& Spiller R,2002). Secretion, motility, and blood flow are only a few of the processes that the central nervous system controls (Mayer EA,2000). Reflex regulation is subsequently influenced by signals originating from the gut. Afferent pathways are activated during the perception of gut events, and information is altered at both the peripheral and central levels (Mayer EA, & Gebhart GF,1994). The development of functional magnetic resonance imaging marked a significant advancement in our knowledge of the brain-gut relationship and how it is altered in irritable bowel syndrome. This method made it possible to evaluate how healthy individuals and IBS patients' brain functions differed in response to gastrointestinal which paved the way for future pharmacological and behavioral therapies. It has been shown that individuals with IBS have distinct brain reactions.

In contrast to patients with ulcerative colitis and controls, measurements of regional cerebral blood flow during rectal distention have demonstrated that patients with IBS have increased activation of the anterior cingulate cortex, amygdala, and dorsomedial frontal cortex (Mayer EA,*et al*,2005). There is a theory that suggests individuals without IBS have more effective activation of endogenous pain inhibitory regions in their brains. This might indicate an inherited susceptibility to IBS. Rectal pain has been demonstrated to be reduced by the antidepressant amitriptyline, and this has been linked to activation of the right insula, right prefrontal cortex, and perigenual anterior cingulate cortex (Morgan V,*et al*, 2004). The possible advantages of antidepressants for IBS may be explained by these core alterations.

Identification and Clinical Presentation

After being first published by Manning et al. 1978, the diagnostic criteria have undergone changes. According to the Rome II criteria, a patient must have experienced stomach pain or discomfort for at least 12 weeks—they don't have to be consecutive—during the previous 12 months. Three characteristics must be present in this pain or discomfort: relief upon defecation, association with a change in frequency of stools, or association with a change in consistency of stools.

The Rome III diagnostic criteria are as follows: the patient must have at least three days of recurrent abdominal pain or discomfort in the previous three months, accompanied by two or more of the following features: improvement in the ability to defecate, onset correlated with a change in frequency of stools, or onset correlated with a change in consistency of stool (Occhipinti K,& Smith JW,2012).

According to the American College of Gastroenterology (ACG), there is no reliable way to diagnose IBS using symptom-based criteria (Brandt LJ*et al*,2009). According to the ACG, IBS is defined as stomach pain or discomfort which lasts for at least three months and is associated with changed bowel patterns.

Because more modern pharmacological drugs are starting to target the established pathophysiologic processes of IBS, the pathogenosity of IBS is significant. A number of factors have been linked to the pathophysiology of IBS, including altered gastrointestinal motility, visceral hypersensitivity, post-infectious reactivity, brain-gut interactions, altered microflora, bacterial overgrowth, food sensitivity, carbohydrate malabsorption, gluten, lactose irritation,and intestinal inflammation.

The various symptom-based criteria identified slightly different subpopulations with the highest

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agreement between the Rome II and III criteria(Engsbro AL et al,2013) (Table (Table1).

S.No.	Diagnostic	Symptoms, signs, and laboratory investigations included in criteria
1	Manning (1978)	IBS is defined as the symptoms given below with no duration of symptoms described. The number of symptoms require to be present to diagnose IBS is not reported in the paper, but a threshold of three positive is the most commonly used: i.Abdominal pain relieved by defecation ii.More frequent stools with onset of pain iii.Looser stools with onset of pain iv.Mucus per rectum v.Feeling of incomplete emptying VI. Patient-reported visible abdominal distension
2	Kruis (1984)	IBS is defined by a logistic regression model that explains the probability of IBS. The Symptoms need to be present for more than two years. Abdominal pain, flatulence, or bowel irregularity Description of character and severity of abdominal pain Alternating constipation and diarrhea Signs that exclude IBS (each determined by the physician): Abnormal physical findings and/or history pathognomonic for any diagnosis other than IBS Erythrocyte sedimentation rate > 20 mm/2 h Leukocytosis> 10000/cc Anemia (Hemoglobin< 12 for women or < 14 for men) Impression by the physician that the patient has rectal bleeding
3	Rome I (1990)	Abdominal pain or discomfort relieved with defecation, or associated with a change in stool frequency two or more of the following on at least 25% of occasions or days for 3 mo: Changed in stool frequency

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		Changed stool type Changed in stool passage Passage of mucus Bloating
	Rome II (1999)	Abdominal discomfort or pain that has two of three features for 12 weeks (need not be consecutive) in the last one year: Relieved after defecation Onset associated with a alter in frequency of stool Onset associated with a alter in form of stool
	Rome III (2000)	Recurrent abdominal pain or discomfort three days per month in the last 3 month associated with two or more of: Improvement with defecation Onset associated with a alter in frequency of stool Onset associated with a alter in form of stool

IBS: Irritable bowel syndrome; 5-HT: 5-hydroxytryptamine.

Treatment

Before talking about treatment choices with a patient who may have IBS, the doctor should carefully conduct a thorough history and physical examination to rule out other conditions that have symptoms similar to those of IBS. The current findings do not justify extensive testing in individuals with IBS, according to the American College of Gastroenterology Functional GI Disorders Task Force (De Ponti F,2004). Compared to the general population, IBS patients do not appear to have a higher prevalence of organic disease. Routine diagnostic testing is not advised if there are no concerning findings, such as weight loss, haematochezia, iron deficiency, or symptoms that are typical of IBS.Testing should include a full blood cell count, a thorough metabolic profile, an inflammatory marker such erythrocyte sedimentation rate or C-reactive protein, and a thyroid stimulating hormone level if symptoms are not warning signals.

If the primary cause of diarrhea is fecal leukocytes, stool tests for Clostridium difficile should be conducted when appropriate (e.g., patients who have recently undergone chemotherapy or who have used antibiotics within the last three months). Stool tests for Giardia and Cryptosporidium antigens may be relevant depending on travel and social background. Every patient suspected of having IBS with diarrhea or mixed subtype should have celiac disease serology, namely tissue transglutaminase, or TTG-IgA, tested as part of the workup.

It has been shown that IBS patients had a greater prevalence of celiac disease (4.67%) than the general population (<1%) (Sanders et al. In contrast, 1.7% of IBS patients tested positive for TTG in a newly released study, which found no difference from the placebo group. However, in cases with non-constipating IBS, testing for celiac disease does appear sensible. Patients who have a family history of colon cancer, inflammatory bowel disease, weight loss, anemia, high inflammatory markers, electrolyte abnormalities, or warning signs such hematochezia, nocturnal or worsening stomach discomfort are all candidates for a colonoscopy. Patients who are older than 50 are also suitable candidates.

Random biopsies should be carried out in patients with IBS-D prior to colonoscopy in order to rule

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out microscopic colitis. The doctor needs to understand that realistic expectations and successful treatment will depend on a solid physician-patient relationship. Many IBS patients have been referred to different doctors for years with inconsistent diagnoses due to a variety of factors, including lack of clinical, physical, or laboratory diagnostic criteria, potential stigma associated with the illness, or a doctor's disinterest in or intense frustration with treating IBS. The medical literature advocates for listening intently and providing thorough explanations of the pathophysiology, natural history, therapy, and prognosis of IBS in order to win the patient's trust during the initial clinical interview.

Spending time on the first appointment and attending to all of the patient's queries and concerns validates their issue. The patient's efforts to understand and accept their condition are aided by this certainty. Establishing realistic expectations and boundaries helps patients take part in their own health care plan and provides them with a more purposeful and organized environment. Long-term goals for this chronic condition are simpler to achieve if a rapport has been built with the patient, as shown by a decline in the frequency of medical visits, a reduction in symptoms, and an increase in patient satisfaction. A doctor should also stress that IBS is a chronic condition, as around 75% of patients still receive an IBS diagnosis five years later (Brenner DM *et. al* 2009).

Non-pharmaceutical Therapy

Complementary and alternative medicine, or CAM, is frequently used to treat persistent illnesses, boost health, and/or prevent disease(Yoon SL et al,2011). Current systematic reviews provide inconsistent results about the usefulness of complementary and alternative medicine for gastrointestinal disorders such as irritable bowel syndrome. According to the American College of Gastroenterology Task Force on IBS, there isn't much solid evidence to support the efficaciousness of CAM therapy. On the other hand, certain systematic reviews provide indications of efficacy(Hussain Z, & Quigley EM,2006). IBS patients appear to embrace hypnotherapy and cognitive-behavioral therapy the most among mind-body therapies.

There has been research on the possible benefits of relaxation techniques for reducing IBS symptoms. Numerous researches have shown a positive relationship between everyday stress, psychological discomfort, and GI symptom aggravation (Liu JP et al,200, Park HJ et al,2008, Blanchard EB,2008,& Choung RS, 2009), which in turn caused symptoms of irritable bowel syndrome. Compared to women without GI symptoms, women with IBS typically report higher levels of psychological distress and lifelong mental illness like schizophrenia (Hertig VL et al,2007).

It seems that relaxation training is at least as helpful as pharmaceutical treatment when it comes to improving symptoms. Physiological alterations brought on by acupuncture can impact a number of endogenous neurotransmitter systems. The consequences of acupuncture and moxibustion on the brain-gut axis's serotonergic and cholinergic neurotransmission is particularly relevant to the treatment of IBS. Acupuncture has been shown to target particular pathways on the serotonergic, cholinergic, and glutamatergic systems, as well as lower blood cortisol levels in both animal and human trials (van der Veek PP, et al,2007, Zhou EH et al,2009, Tian SL et al,2008, Schneider A etal,2007 & Ma XP etal,2009) compared to people without gastrointestinal symptoms(Hertig VL et al, 2007).

Exercise

Certain IBS symptoms may be alleviated by exercise, which may also maintain GI function and lower stress. Physical activity and symptom alleviation have been shown to be positively correlated in some IBS studies (Sigaeva VA et al,1981). Exercise, such as cycling, reduces gas and bloating and prevents the exacerbation of GI symptoms (Kim YJ, &,Ban D, 2005&Lustyk MK*etal*, 2001). In both adult and adolescent groups, yoga has also been found to alleviate IBS symptoms(Kuttner L et al,2006,&van Tilburg MA et al,2008). Exercise programs that promote sympathetic tone—which is lowered in IBS-D patients—include pranayama yoga (Taneja I et al,

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2004). During a two-month research, the standard therapy group was given 2–6 mg of loperamide daily, whereas the yoga intervention group practiced twice a day. The results showed that yoga improved IBS symptoms just as much as traditional treatment (Taneja I et al,2004).

Macronutrients:

Studies on the IBS show a favorable correlation between fat consumption and an increase in stool count and diarrhea. Consuming carbohydrates has the potential to aggravate the symptoms of IBS (Lea R, &Whorwell PJ,2005). Fermentable oligo-, di-, and monosaccharides and polyols (FODMAPs) are among the offending carbohydrates. Fructans, galactans, lactose, fructose, sorbitol, xylitol, and mannitol are members of this group(Ong DKet al,2010). The overwhelming majority of sugar-free or reduced-sugar products contain sorbitol and other sugar alcohols, which are poorly absorbed in the GI tract and can cause flatulence and pain in the abdomen. It has been suggested that mannitol, xylitol, erythritol, lactitol, maltitol, and isomalt are additional sugar-alcohols that exacerbate IBS symptoms.

Fibre

Bloating is inversely correlated with fruit and vegetable fiber consumption (Levy RLetal, 2005). Some patients reported reduced IBS symptoms with the addition of psyllium fiber, particularly those with IBS-C (bloating, gas, or difficulty with regular bowel movements) (Bijkerk CJet al,2004 &Ford Acet al,2008). The amount of soluble (5–30 g) and insoluble (4.1–36 g) fiber added to the diet as well as the length of the research intervention (3–16 weeks) were other highly unpredictable parameters.

Overall, soluble fiber consumption reduced constipation and IBS symptoms across the globe, but insoluble fiber had less of an impact. However, neither strategy helped IBS patients' stomach pain. For IBS-C patients, increasing soluble fiber intake may be advised due to its modest efficiency. Research also showed that adding insoluble fiber to the diet—such as nuts or whole grains—had no impact or made IBS symptoms worse. Moreover, pain relief was not linked to higher fiber intake.

Stress Management

Stress flares up the symptoms of the disease thus making it worse. Studies show us that stress can be a cause and risk factor for IBS. According to a study done by government authorities in 2014, 40%-60% of people with IBS also suffer from stress. Managing stress is considered the root cause of all the diseases that exist today. Various studies have been successful in proving that “gut health is significantly linked with the nervous system.” Thereby, a perfect balance between the two can shatter the chances of digestive disorders.

Importance of Sleep

Improper and lack of sleep worsens the symptoms of IBS. There is a link between IBS and sleep as lack of sleep can hamper the bowel's ability to rest and recuperate, further leading to bowel muscle fatigue that can cause reduced bowel movement and function.

Yoga and Meditation for Irritable Bowel Syndrome

Yoga for IBS, meditation, and breathing exercises play a pivotal and crucial role in providing effective relief from recurrent symptoms of IBS. Meditation helps relax the body and mind and also works on the gut-mind connection and the results are seen as quite effective.

The best yoga poses suggested for the purpose are listed below.

- Parighasana (gate pose)
- Ardha Matsyendrasana (half-seated spinal twist)
- Salamba Setu Bandhasana (supported bridge pose)
- Ananda Balasana (happy baby pose)

Lactose Intolerance

Patients with IBS were found to have a higher probability of lactose malabsorption than the general population and to have significantly more subjective complaints related to lactose intolerance,

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such as bloating, distention, diarrhea, nausea, and occasionally vomiting, stomach cramps, bloating, and gas (Saberi-Firoozi Met al,2007).Low lactase enzyme secretion is the cause of this. There are three varieties of intolerance to lactose. The underlying lactase deficit in each type is caused by a different factor.

Primary lactose intolerance

Individuals with primary lactose intolerance, which is the most prevalent kind, have enough lactase production from birth. Since milk is an infant's only source of nutrition, lactase is necessary. The quantity of lactase that children generate typically decreases as they switch from milk to other foods, but it usually stays high enough to digest the amount of dairy in an average adult diet. In people with primary lactose intolerance, the production of lactase decreases rapidly by maturity, making milk products difficult to digest.

Secondary lactose intolerance

This kind of lactose intolerance occurs when the small intestine reduces its production of lactase following a disease, trauma, or surgery that affects the small intestine. illnesses include Crohn's disease (a persistent inflammation of the GI tract), intestinal infection, celiac disease, and bacterial overgrowth that are linked to secondary lactose intolerance.Though it may take some time, treating the underlying problem may raise lactase levels and improve symptoms.

Inborn or acquired lactose intolerance.

Babies born without lactase may have lactose intolerance, albeit this is uncommon. A kid must inherit the same gene mutation from both parents in order to be affected by this disorder, which is inherited in an autosomal recessive pattern that is passed down from generation to generation. A low level of lactase can also cause lactose intolerance in premature babies.
Bacterial fermentation of the unabsorbed lactose causes the production of hydrogen gas and promotes intestinal distention after lactose consumption. It's interesting to note, nevertheless, that most IBS patients did not pass hydrogen breath tests, which are used to diagnose lactose intolerance (Gupta Det al,2007).

Allopathic Medicine

In the past, medications for specific IBS symptoms like diarrhea, constipation, bloating, and stomach discomfort were used to treat IBS patients. Newer therapies, such as serotonin receptor agonists and antagonists and those that act locally on the gastrointestinal tract's guanylate cyclase receptors (linaclotide) and chloride channels (Lubiprostone.Amitiza), are starting to concentrate on the molecular level, (Ford AC, &Talley NJ,2012). The issue is that there is no one medication that works for everyone, which means that there is a wide range of IBS sufferers, each of whom presents with a unique set of recurring issues.

The large range of complaints and the variable degree of symptom severity contribute to the heterogeneity of the IBS group. The medical literature on IBS therapy is often conflicting due to poorly planned research and unclear outcomes (Jailwala J et al,2000 &Akehurst R, Kaltenthaler E,2001). Short-term trials reveal a 30%-80% response to placebo in IBS patients, which is a considerable response (Talley NJ,2003). Even though a patient may have multiple symptoms, treating each one separately enables the doctor to streamline and plan the best course of treatment.

Bloating

Patients with IBS often complain about bloating, which is still challenging to cure. Theoretically, simethicone and activated charcoal should help reduce bloating, but they haven't shown any real clinical or statistical benefits. More carefully planned research is required to clarify the role of prokinetic agents, which is yet unclear ((Talley NJ,2003). It is important to use caution when prescribing fibre to patients who have a substantial bloating problem because even IBS therapies, including dietary fibre supplements, might exacerbate bloating due to colonic metabolism of non-digestible fibre (Francis CY, &Whorwell PJ, 1994). Gaseous distention can be made worse by non-absorbing carbohydrates like lactulose, which

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may be prescribed to people who frequently experience constipation. The doctor should try to elicit any aerophagia and advise the patient to be aware of gaseous foods like beans, fizzy drinks, etc.

Constipation

When treating symptoms of constipation-predominant IBS, dietary and lifestyle modifications should be the initial management tools. Patients must increase their consumption of fiber-enriched foods, and the physician requires to encourage fluid intake in order to prevent stool dehydration. Bulking agents (psyllium, corn fibre, polycarbophil, ispaghula husk, and methylcellulose) are a simple and inexpensive next-treatment option. Adding these to the diet increases luminal water, which adds bulk to the stool and allows easier stool passage. No benefit was seen with abdominal pain or bloating.

The patients taking psyllium had a significant improvement in relief of symptoms and overall reduction in severity of symptoms. However, bran showed no clinical benefit and actually caused worsening of symptoms in many patients (Francis CY, &Whorwell PJ,1994). Currently, there are no randomized controlled trials examining laxatives in IBS patients (Brandt LJ *et al*,2009). However, polyethylene glycol can be considered for refractory cases as it was shown to improve stool frequency but not abdominal pain (Talley NJ,2003).

Lubiprostone(brand name Amitiza) is a locally acting chloride channel activator that enhances chloride-rich fluid secretion into the intestines, which helps to soften stools and promote bowel movements.. It was initially approved for use in chronic idiopathic constipation, but later received approval for use in women with constipation-predominant IBS. Two placebo-controlled trials as well as an open-label study showed significant overall response to the medication (Drossman DA etal,2009). The approved dose for IBS is 8 μg twice daily, but 24 μg dosing can be used for constipation in chronic case. There seem to be no short-term safety issues and the main side effect is nausea, headach,diarrhoea, flatulence etc. However, long-term safety remains to be established. Further studies will need to be performed to determine its role in treatment of male IBS patients.

Diarrhea

When treating patients with IBS-D (abdominal pain, loose stools, and cramps), the doctor should make an effort to identify any specific circumstances that could trigger the patient's hyperbolic gastric reaction. The anecdotal incident may be anything from eating to strolling or traveling far from a bathroom to worrying about running into someone in public or even at work. Keeping a journal of foods consumed as well as occasions or circumstances that seem to be associated with the development of diarrhea might assist the patient in identifying stresses and help the doctor better plan the course of treatment. The doctor can begin cautious, first-line treatment with antidiarrhea medicines if these anticipated episodes of diarrhea are recognized. Two anti-diarrheamedications frequently used are loperamide and diphenoxylate HCl-atropine.

loperamide is the only one to have been studied for IBS-D. These medications enhances gastrointestinal transit time by interacting with the GI musculature, hence allowing for more water absorption (Talley NJ,2003).

To avoid constipation, the doctor must advise the patient to stop taking these drugs when the diarrhea has passed. Because of this side effect, doctors should use greater caution when administering these medications to IBS patients who alternate between constipation and diarrhea . While opioid drugs can reduce diarrhea, they should be taken very carefully due to the risk of severe constipation and, of course, the potential for addiction. Although taking opioid drugs can reduce diarrhea, one should take them very carefully due to the potential for severe constipation and, of course, the risk of addiction.

About one-third of patients on aldosterone reported experiencing constipation (Zighelboim J *et al*,1995). Following its removal from the market, the US Food and Drug Administration reapproved it under strict guidelines (Drossman DA*etal*,2010),

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and it is now accessible with a recommended regimen that calls for a daily starting dose of 1 mg.

Herbal Medicine

Herbal medicines can offer relief for various conditions, including Irritable Bowel Syndrome (IBS). Many IBS sufferers turn to herbal treatments because they are often perceived as safe and effective. While many patients benefit from complementary and alternative medicine (Spanier *et al*,2003), Aloe has been used extensively to treat IBS patients with constipation. In three randomized trials, peppermint oil showed efficacy in reducing stomach pain and discomfort as well as abdominal distention in IBS patients when compared to a placebo. Peppermint oil works by relaxing smooth muscle, which gives it antispasmodic properties (Merat S*etal,2010 &Cappello Get al,2007).*

According to the American College of Gastroenterology Task Force on IBS, there is limited tolerance that antispasmodics, including peppermint oil, may offer (Brandt LJ,*et a*l,2009). Patients most frequently use "probiotics," such as commercially available Lactobacillus species preparations, to change the natural flora of their colons (Spanier JA*etal,*2003). Because of these preparations' accessibility and extensive marketing campaigns, patients have frequently used them before visiting a doctor. Saccharomyces boulardii, Bifidobacteria, and other probiotic combinations do, however, exhibit some effectiveness. It has been demonstrated that giving IBS patients one capsule daily of the probiotic strain Bifido bacteria infantis 35624 will alleviate pain, bloating, and diarrheal problems while also restoring normal bowel habits (Brenner DM,*et al*,2009).

It has been demonstrated that probiotic strains such as Bifido bacteria lactis DN-173 010 hasten gastrointestinal transit and increase frequency of stools in IBS patients experiencing constipation (Hussain Z, &Quigley EM2006). However, only Bifido bacteria infantis 35624 shown a significant improvement in both general and specific IBS symptoms in studies that were correctly constructed, according to a systematic review of randomized clinical trials examining the efficacy, safety, and tolerability of probiotics in IBS (Brenner DM *et al,* 2009). The downregulation of a proinflammatory state seemed to be the mechanism for improvement. In a well-designed study, no other probiotic significantly reduced the symptoms of IBS (Brenner DM *et al*,2009). Probiotic efficacy is best demonstrated clinically in terms of infection prevention, particularly in the context of older and neonatal populations. Given the paucity of clinical research, the function of probiotics in IBS is yet unknown (Brenner DM,*et al,*2009). Numerous research have examined the function of psychological therapies (Gaylord SA*et al*,2011). Nonetheless, the ACG Task Force found that hypnosis, dynamic psychotherapy, and cognitive therapy are superior to standard care for reducing overall IBS symptoms (Brandt LJ*et al*,2009). Similar to alternative therapy, a lot of patients will look for practices that are seen as unconventional in Western medicine.

Table 2 Emerging therapies for irritable bowel syndrome

Agent	**Mechanism of action**	**Targeted disorder**	**Clinical status**
Peripheral acting agents			
Linaclotide (MD-1100)	Guanylatecyclase-c agonist	IBS-C	Approved by US FDA in 2012, 30th August
Crofelemer	CFTR inhibitor	IBS-D	Phase 2b complete
Verapamil	Kappa opioid agonist	IBS	Phase 2b complete
Mitemcinal	Motilin receptor agonist	IBS-C	Phase 2

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Peripheral and central acting agents			
Ramosetron	5-HT 3 antagonist	IBS-D	Phase 3
TD-5108	5-HT 4 agonist	IBS-C	Phase 2
DDP-773	5-HT 3 agonist	IBS-C	Phase 2
BMS-562086	Corticotropin-releasing hormone antagonist	IBS-D	Phase 2
GW876008	(319) Corticotropin-releasing hormone antagonist	IBS	Phase 2
DDP-225	5-HT 3 antagonist and NE reuptake inhibition	IBS-D	Phase 2
GTP-010	Glucagon-like peptide	IBS pain	Phase 2
AGN-203818	Alpha receptor agonist	IBS pain	Phase 2
Solabegron	Beta-3 receptor agonist	IBS	Phase 2
Espindolol (AGI-011)	Beta receptor antagonist	IBS (all subtypes)	Phase 2
Dextofisopam	2,3 benzodiazepine receptors	IBS-D and IBS-M	Phase 3

IBS-C: Irritable bowel syndrome with constipation; IBS-D: Irritable bowel syndrome with diarrhea; IBS-M: Mixed irritable bowel syndrome; CFTR: Cystic fibrosis transmembrane conductance regulator.

Homeopathic IBS therapy

Homeopathy, a supplementary or alternative medicine approach, operates on the idea of "like cures like"(Frye JC,2003) and employs very diluted chemicals to stimulate the body's natural healing processes. Its goal is to reduce symptoms and promote general well-being while treating irritable bowel syndrome (IBS). Homeopathic treatments may play a role in treating IBS:

Symptom Relief: Homeopathic treatments are tailored to the individual symptoms that an IBS patient may be experiencing. Constipation, diarrhea, bloating, and abdominal pain are common symptoms. Depending on the symptom profile of patient, remedies like Nux Vomica, Colocynth, and Lycopodium are frequently administered.

Holistic Approach: Homeopathy takes into consideration the patient, mental, physical health and emotions of patient: Homeopathic treatment for IBS may target not just the digestive symptoms but also mental factors such as anxiety and depression that may exacerbate the condition.

Individualized Treatment:IBS is treated quite individually using homeopathy. In order to comprehend each patient's distinct symptoms and circumstances, practitioners obtain a thorough case history. The goal of this individualized approach is to offer more specialized and possibly successful therapies.

Stimulating Self-Healing: Homeopathic treatments promote the body's own healing mechanisms. Homeopathy uses very small amounts of natural chemical compounds to help the body heal imbalances that lead to IBS symptoms.

Minimizing Side Effects: Because homeopathic treatments are substantially diluted, supporters

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assert that the likelihood of adverse consequences is reduced. Those with IBS who might be sensitive to traditional drugs may find this especially appealing.

Supporting Digestive Health: In order to promote generale health and function of digestive system, certain homeopathic practitioners may employ prescription drugs that could enhance gut motility, lower inflammation, and balance gut microflora.

Addressing Psychological Factors.Stress and anxiety are two psychological and emotional factors associated with IBS that are frequently addressed with homeopathy and can aggravate symptoms. Sometimes, patients whose symptoms intensify under stress are treated with remedies such as Argentum,Nitricum and Ignatia.

Vomica nux

Nux vomica is a well-liked homeopathic remedy for a variety of digestive problems, including irritable bowel syndrome (IBS). In homoeopathy, nux vomica is used to treat symptoms such as: Abdominal agony and Cramping: It is believed to ease the discomfort and agony brought on by spasms in the abdomen. Constipation Interrupted by Diarrhea: For individuals experiencing irregular bowel movements, Nux vomica is often advised. Gas and Bloating: It is intended to reduce excessive gas and bloating. Indigestion and Nausea: It may relieve indigestion and nausea symptoms, especially after overindulging in rich foods or binge eating. Sensation of Partial Evacuation: This phrase describes those who feel they haven't completely evacuated their bowels.

Lycopodium

Lycopodium clavatum, commonly known as clubmoss, is a homeopathic remedy that is sometimes used in the treatment of irritable bowel syndrome (IBS). Homeopathy is based on the principle of "like cures like" and involves using highly diluted substances to stimulate the body's natural healing processes.

Homeopathic Perspective

Digestive Aid: Lycopodium is thought to assist with a number of digestive problems, including gas, bloating, and a sense of fullness following modest meals. These IBS symptoms are typical. Constipation and Diarrhea: This is a frequent symptom pattern associated with IBS and is utilized in cases where there is an alternation between constipation and diarrhea. Abdominal discomfort: When a bowel movement or the passage of gas relieves an abdominal discomfort, lycopodium may be recommended. The right side of the abdomen usually experiences the worst pain, which can also make you feel distended.
Emotional Factors: Homeopathic physicians frequently take the patient's emotional state into account. Lycopodium is believed to be helpful for those who struggle with worry, low self-confidence, and fear of failing, all of which can worsen.

Natrum muriaticum

It is also known as sodium chloride or common table salt, is another homeopathic remedy sometimes used for Irritable Bowel Syndrome (IBS). Here's its role and importance in managing IBS from both homeopathic and conventional perspectives:

Homeopathic Perspective

A homeopathic treatment called natrum muriaticum is said to help with several IBS symptoms, such as:

Abdominal pain and cramping: It is thought to ease pain and cramps, particularly those related to mental strain.

Constipation and diarrhea: Using natrum muriaticum may be beneficial for patients who experience intermittent constipation and diarrhea, particularly if these symptoms are linked to mental health issues.

Bloating and Gas: It may help reduce bloating and gas.
Emotional Symptoms: This drug is often prescribed for people who internalize their feelings, especially grief and disappointment, as it may exacerbate their

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IBS symptoms.
Sensitivity to Foods: It may be helpful for those with specific food sensitivities or intolerances that exacerbate their IBS symptoms.

Arsenic album

Arsenicum album, a homeopathic remedy derived from arsenic trioxide, is sometimes used to treat Irritable Bowel Syndrome (IBS) and other gastrointestinal disorders.

Homeopathic Perspective

Diarrhea: It is often used to treat this problem, particularly when it is accompanied by searing pain and a sense of urgency.
Abdominal Pain and Cramping: Arsenicum album offer relief from abdominal pain and cramping, especially in situations where the discomfort is intense and unsettling.

Nausea and Vomiting: People who have these symptoms, which are often linked to food poisoning or worry, may be prescribed medicine.

Bloating and Gas: This therapy also addresses excessive gas and bloating.

Anxiety and restlessness: Since these feelings might exacerbate IBS symptoms, it is usually recommended for people who experience fear, anxiety, or restlessness.

Ayurvedic treatment

The primary objective of ayurvedic treatment for irritable bowel syndrome (IBS) is to balance the body's doshas (Pitta, Kapha, and Vata) by dietary adjustments, way of life modifications, use of herbal treatments, and other techniques. The following are some typical Ayurvedic methods for treating IBS:

Dietary and Lifestyle Suggestions

1.Adhere to a Diet Specified by Dosha:

Vata Type IBS: Steer clear of cold, uncooked foods and concentrate on warm, cooked foods. Add the sesame oil, ghee, and spices (cumin, ginger).
Pitta Type IBS: Include cooling herbs like fennel and coriander, stay away from spicy and acidic foods, and emphasize cooling foods like cucumber and melons.

Kapha Type IBS: Include spices like turmeric and black pepper, limit heavy and fatty foods, and prefer light, dry foods.

2. Eat Intentionally: Eat frequently, chew your food well, and refrain from overindulging or missing meals.

3. Remain Hydrated: Steer clear of cold beverages and stick to warm water or herbal teas.

4. Stress Management: To lessen stress and anxiety, which can aggravate IBS symptoms, engage in yoga, meditation, and pranayama (breathing techniques).

Herbal Treatments

1.Triphala: Triphala is a mixture of the three fruits Amalaki, Bibhitaki, and Haritaki that is used to help regulate bowel motions and promote digestive health.

2. Asafoetida (Hing): Asafoetida has carminative properties and is traditionally used to relieve gas and bloating.

3. Aloe Vera: Consuming aloe vera juice soothes the digestive tract and promotes regular bowel movements.

4. Psyllium Husk (Isabgol): This natural fiber supplement can help with diarrhea as well as constipation by regulating bowel movements.

5. licorice root:Also known as yashtimadhu, eases the digestive system and reduces inflammation.

6. Ginger: Reduces inflammation, aids in a healthy digestive system, and may relieve nausea and bloating.

7. Turmeric: It can help reduce intestinal inflammation because of its anti-inflammatory and antioxidant properties.

Other Approaches

1. Abhyanga (Oil Massage): Using heated sesame oil for self-massage on a regular basis might help soothe the nervous system and enhance digestion.

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2. When administered under the supervision of a licensed Ayurvedic physician, barasti, often referred to as enema therapy, can help balance the Vata dosha and clear the intestines.

3. To cleanse their intestines, practitioners of the yoga posture Shakhaprakshalana, also known as "Intestinal Cleansing," sip saline water and do certain poses. This needs to be carried out under an expert's supervision.

4. Herbal Teas: Brewing teas infused with peppermint, fennel, coriander, or cumin can help calm the digestive system and lessen symptoms like bloating and gas.

Conclusion

IBS is a common disorder characterized by abdominal pain and altered bowel habit for at least 3 months. The ACG Task Force recommends that further investigations are required in young patients without alarming features with the exception of celiac sprue serology, which may be of benefit in some patients. Further investigation like colonoscopy is recommended in those over 50 years of age and in patients with alarming features. Psyllium fiber, certain antispasmodics, and peppermint oil arequit effective in IBS patients although there is no authentic evidence. Evidence suggests that some probiotics may be effective in reducing overall IBS symptoms but more data are required.

Anti diarrheals reduce the frequency of stools but do not affect the overall symptoms of IBS. 5HT 3 antagonists are efficacious in IBS patients with diarrhea and the quality of evidence is good. 5HT 4 agonists are modestly effective in IBS patients with constipation and the quality of evidence is good although the possible risk of cardiovascular events associated with these agents may limit their utility. Tricyclic antidepressants and selective serotonin reuptake inhibitors have been shown to be effective in IBS patients of all subtypes. Non absorbable antibiotics are effective particularly in IBS-D and selective C-2 chloride channel activators are efficacious in IBS-C. Psychological therapies may also provide benefit to IBS patients although the quality of evidence is poor. Patients with IBS often seek CAM therapies, including cognitive-behavioural therapy, herbal therapies, probiotics, mind-body therapies, acupuncture, dietary changes, and exercise. Although most CAM therapies seem to provide some benefit in alleviating IBS, it is apparent that the duration, dosages, and specifics of the intervention greatly affect the outcomes.

Oil message and herbal tea: Brewing teas infused with peppermint, fennel, coriander, or cumin can help calm the digestive system and lessen symptoms like bloating and gas.Use botanical products like Psyllium Husk,aloe,asfoetida,Amalaki, Bibhitaki, and Haritaki etc play important role in bring (peristalsicmovement,reduce gas, discomfort.

Reduce stress and anxiety, engage in yoga, meditation, and pranayama (breathing techniques).

It is advisable for patients to consult with a healthcare professional before starting any new treatment regimen, including homeopathy, to ensure it is safe and appropriate for their individual health needs.

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