Convergent Points
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Herbal Modulation of the Gut–Brain Axis in IBS-D: A Case Report

By Erica Yang, MS, MTOM, LAc, Joshua Park, DSOM, LAc, and Timothy Ross, DAOM, LAc

Abstract

Irritable bowel syndrome with diarrhea (IBS-D) is a prevalent and complex psychosocial neuroimmune disorder, influenced by diet, lifestyle, stress, and microbial ecology. Conventional biomedical treatments often focus on individual symptoms, leading to limited long-term efficacy and significant side effects. In contrast, traditional East Asian Medicine (TEAM) offers a comprehensive, whole-systems approach, rooted in millennia of practice and pattern differentiation, addressing underlying constitutional imbalances and the intricate gut-brain axis.

This paper presents a case report of a 32-year-old male with chronic IBS-D, exacerbated by stress and previous travel, whose symptoms persisted despite conventional interventions. Diagnosis, based on traditional East Asian medicine (TEAM) principles, identified Liver qi stagnation and Spleen deficiency as the primary patterns. Herbal treatment involved a modified prescription of the formula Tong Xie Yao Fang (TXYF), known for its multi-target mechanisms, including gut-brain axis regulation, microbiota restoration, anti-inflammatory action, and gut barrier repair. Following two weeks of treatment, the patient experienced complete resolution of abdominal pain and loose stools, demonstrating the efficacy of the modified TXYF combination. This case highlights TEAM's potential for effective, integrated care of complex functional gastrointestinal disorders, bridging ancient wisdom with modern biomedical understanding.

Keywords: Irritable bowel syndrome with diarrhea (IBS-D), traditional East Asian medicine (TEAM), Tong Xie Yao Fang, gut-brain axis, microbiome, case report

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Introduction

Irritable bowel syndrome with diarrhea (IBS-D) is a chronic functional gastrointestinal disorder characterized by recurrent abdominal pain associated with loose or watery stools. Defined by Rome IV criteria, IBS-D occurs when more than 25% of bowel movements are classified as Bristol Stool Scale types 6-7 (Stanford Medicine, n.d.). This disorder involves complex interactions between the gut-brain axis, including altered gastrointestinal motility, visceral hypersensitivity, and intestinal microbiota dysbiosis(Altomare et al., 2021; Hadjivasilis et al., 2019).

IBS-D affects approximately 11.2% of the global population, representing 40% of all IBS cases. The condition exhibits a female predominance, particularly in women under 50, and significantly impacts quality of life and productivity (Endo, 2015; Sperber, 2017).

The pathogenesis of IBS-D involves multiple mechanisms, including visceral hypersensitivity, characterized by an increased perception of normal intestinal stimuli (Bai et al., 2024; Huang et al., 2023). Increased bile acid synthesis and subsequent malabsorption occur in approximately 30% of patients, which stimulates colonic motility and secretion (Min et al., 2022). Furthermore, IBS-D is also associated with altered serotonin signalling and gut microbiota dysbiosis, including a reduction in beneficial bacteria such as Bifidobacterium, which can lead to inflammation (Reference). These higher levels of inflammation in IBS have correlated with increased gut permeability (“leaky gut”), which can further aggravate and perpetuate IBS-D symptoms (Raskov et al., 2016).

Biomedical treatment options for IBS-D include loperamide and eluxadoline for motility, antispasmodics for pain relief, rifaximin for inflammation and dysbiosis, and alosetron for visceral hypersensitivity (Cangemi et al., 2019; Lacy et al., 2021). Each of these medications comes with significant potential side effects. Loperamide, for example, is linked to chronic constipation, toxic megacolon, and cardiac side effects (Sahi et al., 2024). With eluxadoline, there is risk for constipation, nausea, abdominal pain, and pancreatitis (Lembo et al., 2016), and alosetron may be associated with ischemic colitis (Butt et al., 2024). Medical researchers admit that personalized biomedical treatments for IBS-D are a work in progress (Kurin, M., & Cooper, G., 2020).

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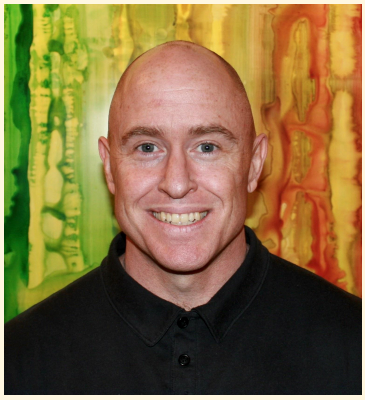

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In TEAM, IBS-D falls under the disease categories of "abdominal pain" (腹痛) and "diarrhea" (泄瀉). Liver depression and Spleen deficiency are the most common patterns noted in the literature (Guo, J., & Yao, X., 2024). A prevalent type of Liver-Spleen disharmony is known as "Wood Overacting on Earth" (木乘土), describing a pathophysiology of the Five Phases' controlling cycle. Nanjing Chapter 50 refers to this as "robber evil" (賊邪), from "what cannot be overcome" (從所不勝來者為賊邪), signifying a distortion of typical physiological control. Neijing Suwen Chapter 67 states: "When qi is excessive, it overacts on what it normally controls and insults what it is not able to control." (氣有餘，則制己所勝而侮不所勝).

This tendency of pathology to move through the controlling cycle is emphasized in the Jin Gui Yao Lue, which notes that: "a doctor who treats disease before it manifests, sees a disease in the Liver [Wood] and knows the Liver will transmit to the Spleen [Earth], therefore first supplement the Spleen..." (夫治未病者，見肝之病，知肝傳脾，當先實脾)."

TEAM recognizes the mind-body interdependence, particularly the emotional impact on digestive health. Huangdi Neijing Suwen Chapter 39 notes: "anger causes the qi to rise, in severe cases there may be vomiting of blood or diarrhea with undigested food" (怒則氣逆，甚則嘔血及飧泄). This passage can be read as a description of brain-gut axis dysregulation leading to chronic diarrhea, which in a modern biomedical context could indicate IBS-D. This possible correlation suggests avenues for further research.

Case Description

A 32-year-old male who worked as a financial analyst presented with a chief complaint of recurrent abdominal pain and diarrhea persisting for three years, with symptom exacerbation over the preceding six months. The patient experienced loose, watery stools four to six times daily. His often post-prandial urgency, cramping, and lower abdominal pain was relieved after defecation, as was abdominal distension with flatulence.

Symptoms began during a period of prolonged work stress, shortly after returning from a trip to Thailand where he had experienced traveller's diarrhea. Previous biomedical treatments, including antibiotics, loperamide, and probiotics, provided only transient relief while causing constipation.

The patient avoided social activities due to fear of sudden bowel urgency. Stress, fatty foods, and dairy products exacerbated the patient's condition, while fasting and applying heat improved it.

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The patient's tongue body was pale with a thin white coating and red lateral borders. On the left, the cun and guan pulse positions were both wiry. On the right, the cun position was rapid, slippery, and superficial; the right guan was weak, and the proper chi position was notably deep and weak.

Abdominal palpation revealed tenderness at ST-25 on deep palpation. There was also subcostal congestion, which was particularly pronounced on the left side. The patient also exhibited frequent sighing and clenched fists when describing occupational stress throughout the initial consultation.

TABLE 1: TEN QUESTIONS ASSESSMENT

Question	Symptoms Reported By Patient
Cold/Heat (寒热)	Symptoms worse with cold; abdominal pain better with heat.
Sweating (汗)	Palmar hyperhidrosis during stress; no other abnormal sweating
Head/Body (頭身)	Temporal headaches preceding diarrheal episodes; chronic low back pain
Urination/Defecation (二便)	Watery stools with mucus; post-prandial urgency; pale urination without dysuria
Eating Habits(飲食)	Poor appetite with post-defecation hunger; preference for warm foods/drinks; fatty food intolerance
Chest/Abdomen (胸腹)	Periumbilical cramping pain radiating to ribs, relieved post-defecation
Hearing (耳聋)	Intermittent stress induced tinnitus episodes, high pitched
Thirst (口渴)	Morning xerostomia; preference for warm beverages
Prior Illnesses (舊病)	Traveler's diarrhea 4 months prior to symptom onset
Etiology (病因)	High-stress occupation; tendency toward frustration and anger; symptom exacerbation during deadlines or conflicts

Table 1: Ten Questions Assessment

Diagnosis and Treatment Strategy

This case suggests Liver qi stagnation induced by chronic stress, which impairs the Spleen transportation function, resulting in damp accumulation and diarrhea. Tongue and pulse findings confirmed Spleen deficiency (pale tongue, weak pulse) and Liver excess (red lateral tongue borders, wiry pulse, sighing, clenched fists, subcostal tension). Additionally, frequent lower back pain, pale urine, and a weak chi pulse position indicated Kidney deficiency. At the same time, mucus in the stool and a slippery right cun pulse at a superficial level, with tenderness on palpation at ST-25, suggested residual damp heat in the Large Intestine.

In this particular case, the patient's high-stress lifestyle and visible manifestations of irritability show how "anger damages the Liver" (怒傷肝) as stated in Suwen Chapter 5 (Huang Di Nei Jing《黃帝內經》). This pre-existing tendency toward Liver excess likely made the patient more susceptible to lasting complications from traveller's diarrhea, which is likely the origin of the IBS-D, given the signs of lingering damp heat in the Large Intestine.

The development of Kidney yang deficiency illustrates the interdependence of the Spleen as the source of post-natal transformation and the Kidney as the prenatal source of warmth. Over a long enough period, weakness in the

Spleen will begin to draw on the Kidney. It also illustrates a continuous movement of pathology through the controlling cycle of the Five Phases, from the Liver to the Spleen and then from the Spleen to the Kidneys. According to Chapter 1 of the Jin Gui Yao Lue, the next phase of the cycle will involve the Kidneys drawing upon the Heart (脾能傷腎，腎氣微弱則水不行，水不行則心火氣盛) (Jin Gui Yao Lue《金匱要略》).

The treatment strategy in this case focused primarily on harmonising the Liver and Spleen, both emolliating and dredging Liver qi while tonifying the Spleen and reducing dampness. The base formula chosen to achieve this result was Tong Xie Yao Fang (TXYF). To address the patient's specific presentation, the formula was modified.

Table 2: Principle, Method, Formula, Herb (Li 理, Fa 法 , Fang 方 , Yao 藥)

Principle (理)	Wood Overacting on Earth
Disease Differentiation (辨病)	Abdominal pain; Diarrhea
Pattern Differentiation (辨證)	**Primary:** Liver Qi Stagnation, Spleen Qi Deficiency with Dampness; **Secondary:** Kidney Yang Deficiency Failing to Warm Spleen, Residual Damp Heat Lurking in Large Intestine
Treatment Method (治法)	Harmonize the Liver and Spleen (Root Pattern); Tonify Kidney Yang; Clear Large Intestine Damp Heat (Secondary Patterns); Soothe Urgency and Stop Pain (Branch Manifestation)
Formula (方)	Tong Xie Yao Fang
Herbal Modifications (藥)	Add Chai Hu, Gan Cao, Tu Su Zi, Fang Feng

Table 2: Traditional East Asian Medicine Diagnostic Analysis

Herbal Formula and Modifications

In modern times, TXYF is one of the most researched formulas for IBS-D. It was first mentioned in Chapter 2 of "Essential Teachings of Zhu Danxi"《丹溪心法》in the Ming Dynasty. At that time, however, the formula was described without an explicit name. The prescription was given for "painful diarrhea" (治痛泄), and subsequently was referred to as "Important Formula for Treating Painful Diarrhea" (TXYF). It was also mentioned in the late Ming Dynasty text "Systematic Great Compendium of Medicine Past and Present"《古今醫統大全》by Xu Chunfu, where it was called "Bai Zhu Shao Yao San" (白術芍藥散) and

noted that in cases of chronic diarrhea, six qian (30 g) of sheng ma should be added (久瀉者加升麻六錢).

The formula was given its definitive, current name in Chapter 2 of Wu Kun's "Investigations of Medical Formulas" 醫方考. This text described the pathophysiology of the formula: "The Spleen is responsible for diarrhea and the Liver is responsible for pain; the Liver is responsible for repletion and the Spleen is responsible for vacuity. Spleen vacuity and Liver repletion cause painful diarrhea, and this is the prescription." (瀉責之脾，痛責之肝；肝責之實，脾責之虛。脾虛肝實，故令痛瀉，是方也).

As the clinical picture increasingly indicated Liver qi constraint as the primary aggravating factor, the formula was modified to both nourish and soften the Liver with bai shao, to dredge and regulate Liver qi with chai hu, and to alleviate tension with gan cao. The addition of chai hu incorporates the classical formula Si Ni San, which can effectively treat constraint-pattern abdominal pain and diarrhea. Adding an equal amount of gan cao to bai shao incorporates Shao Yao Gan Cao Tang for antispasmodic effects, exemplifying the principle of using a sweet flavour to relax the Liver.

Secondarily, the patterns of Kidney yang deficiency and residual damp heat in the Large Intestine were addressed with further modifications. Firstly, the Kidney yang deficiency was managed with the inclusion of tu su zei, which astringes the intestines while also tonifying the Kidney yang and stopping diarrhea. Residual damp-heat was addressed via the addition of ge gen, which can gently clear heat, generate fluids, and raise yang to stop diarrhea.

Table 3 : Formula Composition for Modified Tong Xie Yao Fang (痛瀉要方加味)

Ingredient	Dosage
Chao Bai Zhu (炒白術)	15g
Chao Bai Shao (炒白芍)	12g
Chen Pi (陳皮)	9g
Fang Feng (防風)	9g
Chai Hu (柴胡)	9g
Tu Si Zi (菟絲子)	9g
Ge Gen (葛根)	12g
Gan Cao (甘草)	12g

Table 3: Formula Composition for Modified Tong Xie Yao Fang

Outcomes

The patient was provided with a two-week supply of the herbs in granule form. Abdominal pain was reduced by more than 50% after two days on the formula, with bowel movements progressing from daily loose stools to every other day. Ultimately, complete resolution of both abdominal pain and loose stools was achieved by the end of the two-week course of treatment.

As reported at a follow-up one month later, the patient had been passing one to two well-formed bowel movements per day, with no pain or other symptoms. He was advised on stress management, including qigong exercises, to ensure no further recurrence.

Discussion

IBS-D is a complex condition involving the brain-gut axis, neuro-immune crosstalk, and gut microbiota. TXYF offers multi-target therapeutic effects by regulating the gut-brain axis, modulating gut microbiota, providing anti-inflammatory action, and repairing the gut barrier, addressing key etiological factors.

Regarding the gut-brain axis, TXYF's baishao reduces nNOS overexpression, soothing spasms and regulating motility (Han, et al., 2021; Tan, et al., 2020) TXYF also inhibits CHRM3 expression, alleviating smooth muscle contraction and spasms(Feng, et al., 2024) Furthermore, it lowers colonic serotonin (5-HT) and substance P, regulating 5-HT via microbiome modulation to dampen visceral hypersensitivity (Li, et al., 2018; Yin, et al., 2015).

For microbiota restoration, modified TXYF increases Akkermansia and beneficial species, such as Bifidobacterium and Lactobacillus, via bai zhu and fang feng, while reducing Clostridium sensu stricto 1 (Li et al., 2018; Qi et al., 2015; Yan et al., 2011). The microbiome modulation of TXYF also upregulates intestinal Fgf15, a feedback signal controlling bile acid synthesis, which links to the TEAM concept of Liver overacting on Spleen with bile acid diarrhea. (Jia et al., 2024)

TXYF also exhibits both anti-inflammatory properties and is capable of helping to repair the gut barrier. It has been shown to downregulate the NF-κB/Notch pathway, reducing inflammatory cytokines (IL-6, TNF-α), modulating goblet cell secretion, and protecting the gut barrier by decreasing intestinal permeability. (Feng, et al., 2024; Hou, et al., 2019)

The additional herbs, chai hu, ge gen, tu su zi, and gan cao, synergise with TXYF. Chai hu exhibits anti-inflammatory and antidepressant effects by

modulating the NF-κB/MAPK pathways, as well as neurotransmitters. (Ashor & Wink, et al., 2014; Ran, et al., 2024) Ge gen modulates GI motility with antidiarrheal, antispasmodic, and anti-inflammatory properties. (Zhou, et al 2014; Choi, et al., 2016). Tu su zi exhibits anti-inflammatory, mucosal protective, and antioxidant effects. (Yang, et al., 2024) Bai shao and gan cao together decrease visceral hypersensitivity by downregulating TRPV1 and 5-HT. (Shao, et al., 2020) These additions strengthen the overall effect of TXYF on stress, motility, hypersensitivity, and barrier dysfunction.

This case study suggests several avenues for future research. One promising area is metabolomic analysis. Metabolomics analysis is the comprehensive study of small molecules, known as metabolites, in cells, tissues, or organisms. Using technologies such as gas chromatography-mass spectrometry (GC-MS) and liquid chromatography-mass spectrometry (LC-MS), researchers can identify specific metabolites linked to biomarkers, diseases, or drug responses. This enables a greater understanding of how various factors impact health.

Metabolomics studies of TXYF and other TEAM herbal formulations consistently reveal complex, multi-target mechanisms of action (Wang et al., 2019). Such studies can help advance our understanding of crosstalk between the gut microbiome, brain, and immune system, illuminating our understanding of pathophysiology and providing novel therapeutic targets for IBS and other complex, multi-factorial diseases (Sharma & Yadav 2022).

Personalized medicine has been the standard in TEAM for over two thousand years. Tailoring treatments and prescriptions is achieved through pattern differentiation (bian zheng lun zhi 辯證論治). Case reports such as this one, which combine a classical understanding of symptom patterns and formula architecture with data-driven analysis of biochemical mechanisms, indicate the possibility of a future pattern-based precision medicine that draws equally from ancient and modern perspectives, as well as eastern and western traditions.

Conclusion

The patient had suffered from IBS-D for years, which had severely diminished his quality of life, impacting his ability to participate in work as well as social events. After only two weeks of treatment, his symptoms had resolved, and he was able to return to his previous level of activity. TEAM was able to provide a relatively rapid solution in this case, where conventional measures had failed due to its whole-systems approach to treatment.

This case demonstrates the effectiveness of TEAM pattern differentiation in treating IBS-D. The successful resolution of chronic symptoms through modified TXYF illustrates the importance of precise pattern differentiation and how the flow of the Five Phases enabled the tracking of the pathology's trajectory.

The integration of classical TEAM theory with modern science provides a framework for understanding and treating IBS-D. Further research investigating the mechanisms of action and clinical efficacy of traditional formulas, such as TXYF, in treating IBS-D would be valuable for the evidence-based integration of TEAM therapeutics.

Informed Consent

The patient provided written informed consent for the publication of this case report, and a copy is on file with the authors.

Safety

No adverse events were anticipated or reported.

Resources

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