

Research on Mechanism of Traditional Chinese Medicine and Rehabilitation Treatment of IBS from Intestinal Flora

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ABSTRACT

Objective To Irritable bowel syndrome (IBS) is a recurrent functional gastrointestinal disease. There is no organic change in IBS, and its pathophysiology is not completely clear. At present, the pathogenesis of IBS includes genetic factors, food intolerance, abnormal intestinal motility, visceral hypersensitivity, abnormal brain gut axis regulation, intestinal flora imbalance, intestinal infection and immune factors, as well as psychological factors. Traditional Chinese medicine, as the dominant subject of gastrointestinal diseases, has good clinical effect and is not easy to relapse. It has obvious effect in the treatment of IBS and is widely used. This article will review the importance of traditional Chinese medicine in the treatment of IBS, intestinal flora in the prevention and treatment of IBS, and the research progress of IBS rehabilitation intervention.

KEYWORDS

Irritable Bowel Syndrome (IBS); Traditional Chinese Medicine (TCM); Rehabilitation; Intestinal Flora

Rome IV ^[1] points out that Irritable Bowel Syndrome (IBS) is a recurrent chronic functional gastrointestinal disease characterized by abdominal pain and bloating accompanied by changes in defecation patterns, and organic lesions that cannot explain the symptoms. IBS is divided into four subtypes based on fecal viscosity^[2]: Diarrhea type (IBS-D), Constipation type (IBS-C), Mixed type (IBS-M), and Unstyping type (IBS-U). The pathogenesis of this disease includes genetic factors, food intolerance, gastrointestinal motility abnormalities, visceral hypersensitivity, abnormal regulation of the brain gut axis, dysbiosis of the gut microbiota, intestinal infections and immune factors, as well as psychological factors. The pathophysiological mechanism of IBS is not fully understood, therefore there is a lack of effective treatment methods. Traditional Chinese Medicine, as an advantageous discipline for treating gastrointestinal diseases, plays an important role in the treatment of IBS. This article will provide an overview of the pathogenesis of IBS, the methods and mechanisms of traditional Chinese medicine treatment for IBS, and rehabilitation intervention methods, providing reference for the prevention and treatment of IBS.

1 Overview of the Pathogenesis of IBS

IBS symptoms can be mediated by multiple factors. A high FODMAP diet can regulate intestinal nociceptive response ^[3]. IBS intestinal motility abnormalities are mainly manifested as colon and pelvic floor dysfunction related to the enteric nervous system (NES), gastrointestinal hormones, and neuroendocrine system ^[4-5]. IBS visceral hypersensitivity is related to the regulation of symbiotic bacteria, afferent nerves, immunity, and endocrine systems ^[6-7]. The increase of eosinophils and mast cells, as well as changes in the proportion of T lymphocytes, may be the cause of abdominal pain in IBS ^[8]. There is a widespread imbalance in the gut microbiota of IBS patients, and studies have shown that IBS-D is associated with excessive growth of small intestinal bacteria, while IBS-C is associated with increased levels of methanogens ^[9]. Microorganisms can also regulate the perception of pain through the amygdala, causing the sensation of abdominal pain ^[10]. Antibiotics, probiotics, and fecal microbiota transplantation can all improve the symptoms of IBS, indicating that the symptoms of IBS are largely mediated by the gut microbiota ^[11-13]. The relationship between stress and microbiota has been confirmed in the study of the brain gut axis, and beneficial microbiota can play a biological regulatory role, activate immunity, alleviate intestinal dysfunction, and improve depression and anxiety ^[14].

The pathogenesis of IBS is concentrated in the brain gut axis and involves microbiota, immunity, and endocrine factors. The gut microbiota communicates with the central nervous system through at least three parallel and interacting channels ^[15].

2 Traditional Chinese Medicine Treatment for IBS

According to the consensus opinion of traditional Chinese medicine diagnosis and treatment experts on irritable bowel syndrome ^[16], IBS clinical manifestations are classified as "diarrhea", "constipation", and "abdominal pain". Its causes

include congenital deficiencies and/or acquired malnutrition, irregular diet, susceptibility to external pathogens, and emotional disorders. The disease is located in the intestine and mainly involves organs such as the liver, spleen (stomach), kidneys, heart, and lungs. The main pathogenesis includes liver dysfunction, spleen dysfunction, and spleen kidney yang deficiency. IBS-D and IBS-C each have 5 types of syndromes. Traditional Chinese medicine treatment is divided into internal treatment and external treatment.

2.1 Internal Treatment with Traditional Chinese Medicine

2.1.1 Self Formulated Formula for Syndrome Differentiation and Treatment

Self formulated prescriptions are formulated by medical professionals based on their experience. The most common syndrome types of IBS-D are liver depression and spleen deficiency syndrome and spleen yang deficiency syndrome, while the most common syndrome type of IBS-C is intestinal dryness and heat syndrome^[17]. Prescriptions are usually formulated based on the pathogenesis, and are often named after the principle of treatment.

The overall dialectical medication used in the treatment of IBS^[18] is mainly composed of *Atractylodes macrocephala*, *Glycyrrhiza uralensis*, *Chenpi peel*, *Poria cocos*, *Paeonia lactiflora*, *Codonopsis pilosula*, *Bupleurum chinense*, *Eucommia ulmoides*, *Fructus Aurantii immaturus*, *Windproof*, *Yam*, *Coix seed*, *Amomum villi*, etc. According to the pathogenesis, various medical practitioners formulate formulas, including liver soothing and spleen strengthening formula, spleen strengthening and qi regulating formula, depression relieving and diarrhea relieving formula, warming kidney and spleen strengthening formula, kidney tonifying and astringent formula, and clearing damp heat formula^[19].

2.1.2 Diagnosis and Treatment Based on Classic Prescription and Differentiation of Syndromes

Classic formula is the most common form of formula in clinical practice. IBS-D is divided into syndrome types such as liver qi mixed with spleen, spleen and stomach weakness, spleen and kidney yang deficiency, and large intestine damp heat. The recommended medications are *Tong Xie Yao Fang*, *Shen Ling Bai Zhu San*, *Fu Zi Li Zhong Tang*, and *Ge Gen Qin Lian Tang*. IBS-C is divided into liver depression and qi stagnation and large intestine dryness and heat syndrome, and its medication is *Liumo Tang* and *Maziren Wan*^[20]. The top ten most frequently used classic formulas are *Tong Xie Yao Fang*, *Shen Ling Bai Zhu San*, *Xiao Yao San*, *Si Ni San*, *Xie Xin Tang*, *Chai Hu Shu Gan San*, *Si Shen Wan*, *Si Jun Zi Tang*, *Liu Jun Zi Tang*, and *Wu Mei Wan*^[21].

2.2 Acupoint Application

The principle of external treatment is the principle of internal treatment, and the medicine for external treatment is the medicine for internal treatment.

Acupoint application therapy is a unique traditional Chinese medicine external treatment method that combines the dual effects of acupoints and drugs. It can be used alone in clinical practice or in combination with traditional Chinese medicine, acupuncture, Western medicine, and traditional Chinese medicine external treatment. Specific applications should be based on syndrome differentiation and treatment^[22]. The drugs for acupoint application are widely used. In addition to classic prescriptions, they are also mostly applied with self prepared pharmaceutical cakes, including *Evodia rutaecarpa*, *Paeonia lactiflora*, *Bupleurum chinense*, *Fructus aurantii*, liquorice, white mustard, *asarum*, *kansui*, *corydalis*, *cinnamon*, etc., which are ground into powder, mixed with ginger juice or *Baijiu* and then applied at the acupoints^[23, 24]. This method is safe, effective, cost-effective, easy to operate, and widely used in clinical practice, and is worthy of further promotion.

2.3 Correlation between Traditional Chinese Medicine Treatment of IBS and Gut Microbiota

2.3.1 Internal Treatment with Traditional Chinese Medicine

The pharmacological effects of traditional Chinese medicine on IBS involve the expression of amino acids, vitamin B6, 5-HT, microRNA, and are related to the regulation of intestinal function, gut microbiota, inflammation, endocrine system, nervous system, etc.^[25-27]. The gut microbiota of different IBS-D syndromes varies in phyla, classes, orders, and families^[28]. After administration of the painful diarrhea prescription, the abundance of Firmicutes, Bacteroidetes, and Proteobacteria in the IBS-D gut microbiota increased^[29]. *Shenling Baizhu Powder* can regulate inflammatory factors and gut microbiota^[30], significantly reducing *Enterococcus* and *Escherichia coli* at the genus level, and increasing *Lactobacillus* and *Bifidobacterium*^[31, 32]. *Jianpi Heji* can also regulate the balance between beneficial and harmful bacteria^[33].

2.3.2 External Treatment with Traditional Chinese Medicine

The principle of external governance is the principle of internal governance. Research has shown that acupuncture or moxibustion at Shangjuxu, Tianshu, Zusanli, and Dachangshu points can reduce the expression of P2X receptors associated with visceral hypersensitivity and alleviate clinical symptoms of IBS^[34-36]. External treatment with electroacupuncture at acupoints such as Tian Shu, Zu San Li, San Yin Jiao, and Tai Chong can reduce the expression of CRF and CRF-R1, increase the expression of ZO-1, alleviate anxiety and depression, and repair the intestinal mucosa^[37]. Moxibustion improves inflammatory symptoms and visceral hypersensitivity by increasing the levels of lactobacilli, bifidobacteria, and fecal enterococci, reducing the levels of *Escherichia coli*, and regulating inflammatory proteins such as NLRP6, IKK β , IKB α , NF - κ B (p65)^[38].

3 Application of Rehabilitation Intervention in IBS

Non pharmacological intervention for IBS is receiving increasing attention and is expected to become an important prevention and treatment measure for IBS. For IBS patients, rehabilitation interventions mainly include exercise therapy, physical therapy, and psychotherapy.

3.1 Exercise Therapy

Exercise intervention is one of the safest and most effective ways. Chronic constipation is widely recognized to be caused by colonic sensory motor disorders and pelvic floor dysfunction^[4]. Pelvic floor muscle training (Kegel exercises) can improve function through anal sphincter exercises and compound exercises. Moderate intensity aerobic exercise for ≥ 30 minutes per day can prevent IBS, promote gastrointestinal peristalsis, improve bloating and constipation, and alleviate anxiety and depression^[39]. In addition, studies have shown^[40] that exercise can regulate gut microbiota. After exercise, the abundance of bacteria belonging to the genus *Veillonella* and *Firmicutes* in the gut significantly increases, while the abundance of *Bacteroidetes* decreases. These changes not only increase metabolism, but also improve anxiety and enhance memory. Exercise plays an important role in regulating the brain gut axis.

3.2 Physical Therapy

Physical therapy has also played a positive role in treating IBS. Ultra short wave therapy can improve the symptoms of abdominal pain and diarrhea in IBS-D patients while enhancing their immune function^[41]. The application of electromyographic biofeedback can increase the rectal pain threshold of IBS and improve abdominal pain symptoms^[42]. The application of TEAS can significantly improve abdominal symptoms as well as stool shape and frequency^[43].

3.3 Psychotherapy

The onset of IBS is related to psychological factors. Hypnosis therapy, supportive therapy, explanatory psychotherapy, motivational psychotherapy, cognitive therapy, relaxation therapy, music therapy, and others are widely used in the treatment of IBS. Through psychological adjustment, including appropriate emotional therapy, relaxation training, abdominal breathing, and relaxation therapy, IBS symptoms can be significantly improved^[44].

4 Conclusion

Traditional Chinese medicine, as an advantageous discipline for treating gastrointestinal diseases, plays a unique and irreplaceable role in the treatment of IBS. The pathogenesis of IBS is related to the disorder of bioactive regulatory factors on the brain gut axis, and traditional Chinese medicine can better regulate the balance of various substances in the treatment of IBS, including various brain gut peptides, inflammatory cytokines, and gut microbiota. Non pharmacological exercise therapy, as a method of regulating gut microbiota, is increasingly being valued. Although traditional Chinese medicine is effective in treating IBS, there are still many unknown mechanisms waiting to be explored. Existing research has mostly focused on several classic formulas, and there is relatively little research on the treatment of single Chinese medicine and the correlation between single Chinese medicine and gut microbiota; Exercise, as an important non pharmacological intervention, also requires further research. Afterwards, research on traditional Chinese medicine, exercise intervention, and gut microbiota will inevitably develop towards deeper and more comprehensive perspectives.

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