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# The Latest Research Progress on Traditional Chinese Medicine Treatment of Functional Gastrointestinal Diseases with Emotional Disorders based on the "Brain-gut Axis" and "Neuroendocrine-immune Network"

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**Abstract:** ***Functional gastrointestinal disorders (FGIDs) are a common group of conditions characterised by digestive symptoms but lacking evidence of organic lesions, with a global prevalence of approximately 40%, making them a significant public health issue. FGIDs often co-occur with emotional disorders such as anxiety and depression, forming a vicious cycle through the 'brain-gut axis' and the 'neuroendocrine-immune (NEI) network.' Modern medical treatments have limitations, whereas traditional Chinese medicine (TCM), based on the principles of holistic thinking and syndrome differentiation, regulates the NEI system to achieve 'brain-gut synchronisation.' This paper, based on the brain-gut axis theory, systematically elucidates TCM's understanding of the brain-gut relationship, analyses the pathogenesis of FGIDs accompanied by emotional disorders from both Western and Chinese medical perspectives, and summarises the roles and research progress of TCM treatment methods such as liver-regulating and spleen-harmonising methods, heart-nourishing and spirit-regulating methods, and acupuncture therapy. The aim is to provide theoretical guidance for clinical treatment.***

**Keywords:** Brain-gut axis, Neuroendocrine-immune network, Functional gastrointestinal disorders, Emotional disorders.

## 1. Introduction

Functional gastrointestinal disorders (FGIDs) are a group of conditions characterised by digestive system symptoms, where no organic lesions are detected through biochemical, imaging, or endoscopic examinations. The global prevalence rate is approximately 40% [1]. China is a high-prevalence country for FGIDs, with studies indicating an overall prevalence rate of 26.9% in the general population, making it a significant public health issue affecting the health of Chinese residents [2]. The pathogenesis of FGIDs is complex. Existing domestic and international studies indicate that the onset of FGIDs is closely related to brain-gut axis dysfunction, intestinal flora imbalance, visceral hypersensitivity, neuroendocrine-immune network homeostasis imbalance, and psychosocial factors [3]. FGIDs is a brain-gut interaction disorder disease, manifested as psychosomatic comorbidity [4]. Numerous studies have shown that patients with FGIDs often have varying degrees of emotional disorders. Epidemiological data shows that the proportion of FGIDs patients with coexisting mental and psychological disorders is as high as 44%, with anxiety and depression being the most common mental and psychological disorders among FGIDs patients [5]. Anxiety, depression, and other emotional issues are not only important comorbid symptoms of FGIDs but can also significantly exacerbate gastrointestinal symptoms, creating a vicious cycle of 'emotion-symptom-anxiety exacerbation' severely impacting patients' quality of life and mental and physical health. The 'gut-brain axis' (GBA) theory proposed by modern medicine provides a core framework for understanding this comorbidity phenomenon, revealing the complex bidirectional regulatory mechanisms between the brain and the gut through neural, endocrine, and immune (NEI) pathways [6].

Western medicine treatment for FGIDs accompanied by anxiety and depression is mainly symptomatic, with drugs primarily including acid suppressants, neuromodulators, and anti-anxiety and antidepressants. However, these treatments lack specificity and are not very effective [7]. Furthermore, the use of anti-anxiety and antidepressant drugs may exacerbate neuroendocrine immune dysfunction in patients, thereby worsening their condition. Traditional Chinese medicine (TCM), guided by the concept of holistic medicine, employs the method of syndrome differentiation and treatment to regulate the neuroendocrine-immune (NEI) system, thereby facilitating information exchange and functional coordination between the gastrointestinal tract and the central nervous system. This approach demonstrates unique advantages in improving the core symptoms of functional gastrointestinal disorders (FGIDs) accompanied by emotional disorders, characterised by multi-target, multi-pathway, and holistic regulation. This paper aims to systematically explore the mechanisms of action and research progress of TCM in regulating the NEI system to treat FGIDs with emotional disorders based on the brain-gut axis theory, with the goal of providing theoretical support for clinical practice.

## 2. The Connection between the Brain-gut Axis and Neuroendocrine Immunity

The brain-gut axis is a complex network composed of the central nervous system (CNS), enteric nervous system (ENS), autonomic nervous system (ANS), neuroendocrine system, and gut microbiota [8]. The CNS and ENS interact with each

other through the ANS and neuroendocrine system to achieve brain-gut information exchange, a process known as 'brain-gut interaction' [9]. The brain-gut axis serves as a bidirectional regulatory pathway between the brain and the gut, with its mechanisms involving multiple pathways. On one hand, the CNS integrates information obtained from changes in the internal and external environment and directly acts on target cells in the gastrointestinal tract to regulate gastrointestinal function. It can also transmit regulatory signals through the autonomic nervous system (ANS) and the neuroendocrine system's hypothalamic-pituitary-adrenal axis (HPA axis) by secreting related hormones [10], thereby modulating the function of the enteric nervous system (ENS) and influencing gastrointestinal motility, secretion, sensation, and immunity. On the other hand, independent neurons in the ENS receive regulation from the CNS while also sensing chemical, mechanical, and osmotic stimuli within the intestine. They transmit signals to the CNS via the vagus nerve and spinal cord, influencing brain function and mood. They can also autonomously secrete neurotransmitters or hormones to regulate gastrointestinal motility, immune responses, and intestinal barrier integrity [11]. In addition, the gut microbiota, as an important component of the gut-brain axis, influences the function of the CNS and ENS through the production of neurotransmitters and metabolites, while also being regulated by the CNS and ENS. Changes in the gut microbiota and its associated metabolites play a crucial role in the onset and development of gastrointestinal motility disorders.

The neuro-endocrine-immune network (NEI) regulates homeostasis through dynamic interactions between the nervous, endocrine, and immune systems. At its core is a bidirectional regulatory network formed by shared signalling molecules and receptors, which serves as a key mediator for brain-gut information exchange. Imbalances in NEI homeostasis may be one of the important causes of FGIDs [12]. The association between the brain-gut axis and the neuroendocrine-immune network is manifested as dynamic interactions within a multi-level signalling network, with its core mechanisms involving the coordinated regulation of neural transmission, hormone secretion, and immune responses. The normal functioning of the brain-gut axis relies on the synergistic interaction of the nervous, endocrine, and immune systems, which together form a highly integrated neuroendocrine-immune (NEI) regulatory network. In this network, information flows in both directions: the brain's emotional and cognitive states can significantly influence the gut's sensory, motor, and secretory functions; conversely, signals originating from the gut (including the gut microbiota) can profoundly affect brain function, even participating in the regulation of emotions, behaviour, and higher cognitive processes [13]. When this delicate balance is disrupted, the effects extend far beyond the digestive system and are closely associated with a range of seemingly unrelated conditions, including mental health disorders, metabolic syndrome, neurodegenerative diseases, and autoimmune diseases [14].

## 3. Understanding of the Brain-Gut Axis in Traditional Chinese Medicine Theory

Although traditional Chinese medicine has not explicitly proposed the concept of the 'brain-gut axis,' its theoretical framework, including the concept of holism, meridian theory, and organ-related theory, contains a profound understanding of the relationship between the brain and the gut, which shares many similarities with the modern medical theory of the 'brain-gut axis. 'In modern medicine's 'brain-gut axis' theory, the "brain" mostly refers to the central nervous system, which corresponds to the 'master of the spirit' in traditional Chinese medicine. Traditional Chinese medicine believes that 'the heart governs the spirit' and 'the brain is the repository of the original spirit.' Together, the heart and brain govern human mental consciousness and thought processes. The 'intestines' refer to the digestive system, corresponding to the spleen, stomach, large intestine, small intestine, and other organs in traditional Chinese medicine theory. They mainly refer to the functions of transporting and transforming food essence, separating clear from turbid, and excreting waste [15].

### 3.1 Holistic Concept

Traditional Chinese medicine emphasises that the human body is an organic whole, with all organs and tissues interdependent and interconnected. The functional coordination and influence between the brain and intestines is mainly reflected in the coordination and mutual use between the heart and brain and the spleen, stomach, and intestines. The heart and brain govern human mental, conscious, and cognitive activities, and their normal functioning depends on the nourishment provided by the spleen and stomach's transformation of food and drink into essence. Physiologically, the spleen and stomach convert food and drink into nutrients such as water and grain essence, which are then transported to the heart, brain, and throughout the body, ensuring that the brain is nourished, the heart is sustained, and the spirit is centred. Conversely, if the spleen and stomach functions are abnormal and there is insufficient production of qi, blood, and essence, the heart and brain will be malnourished, leading to emotional disorders such as restlessness, insomnia, anxiety, and depression. At the same time, the functional state of the brain can also affect the normal functioning of the spleen and stomach. When a person is in a state of mental tension, anxiety, depression, or other negative emotions, they often experience symptoms of spleen and stomach dysfunction, such as loss of appetite, abdominal distension, abdominal pain, and diarrhoea. This is consistent with the modern medical view that changes in brain emotions affect gastrointestinal function through the brain-gut axis.

### 3.2 Meridian Theory

Meridians are the channels through which qi and blood circulate in the human body, and they also serve as bridges connecting the internal organs. In the meridian system, there is a close connection between the brain and the intestines. As recorded in Ling Shu Jing Mai: 'The stomach meridian of the foot yangming... follows the hairline to the forehead' and 'the foot yangming diverges... and connects to the head and neck. 'The Stomach Meridian of the Foot-Yangming directly connects to the brain, transporting the essence of water and grains produced by the spleen and stomach through the meridian channels, rising and falling with the flow of qi, and nourishing the brain. In addition, the Stomach Meridian of the Foot-Yangming runs from the head to the foot, while its paired meridian, the Spleen Meridian of the Foot-Taiyin, runs from the foot to the abdomen. The Large Intestine Meridian of

the Hand-Yangming and the Small Intestine Meridian of the Hand-Taiyang both traverse the head and face, connecting to the brain through the meridians. The Hand Taiyang Small Intestine Meridian and the Hand Shaoyin Heart Meridian are paired via collateral and branch meridians. The pathways of these meridians indicate that the heart and brain are interconnected with the stomach and intestines through the meridian system, allowing qi and blood to circulate continuously, thereby establishing physiological connections and pathological influences between them. When the flow of qi and blood in the meridians is blocked or obstructed, it can lead to impaired communication between the heart, brain, and gastrointestinal tract, thereby triggering corresponding symptoms. For example, poor circulation of qi and blood in the Yangming meridian can cause symptoms such as headaches, toothaches, abdominal distension, and constipation. Brain disorders can also affect the intestines through the meridians. For example, stroke patients often suffer from constipation and other intestinal disorders.

### 3.3 Theory Related to Internal Organs:

(1) The relationship between the heart, brain, and gastrointestinal tract: According to traditional Chinese medicine, the heart governs the spirit, and the brain is the repository of the original spirit. Together, the heart and brain govern human mental consciousness and thought processes. The heart is paired with the small intestine, while the spleen and stomach are the foundation of postnatal life and the source of qi and blood. The normal functioning of the heart and brain depends on the nourishment provided by the spleen and stomach's transformation of food and drink into nutrients. At the same time, changes in the emotions of the heart and brain can also affect the spleen and stomach's ability to transform food and drink. If the mind is restless and emotions are not smooth, it can lead to an imbalance in the spleen and stomach's qi, resulting in symptoms such as epigastric distension, loss of appetite, abdominal pain, and diarrhoea. The Suwen·Yin Yang Ying Xiang Da Lun says, 'Anger damages the liver, sadness overcomes anger... thought overcomes fear. 'This explains the impact of emotional changes on organ function, with thought damaging the spleen reflecting the close relationship between the heart and brain emotions and the spleen and stomach's transformation and transport functions.

(2) The relationship between the liver and gastrointestinal tract: The liver is responsible for regulating the flow of qi, promoting the harmonious functioning of the spleen and stomach. On the one hand, when the liver's regulatory function is normal, the spleen and stomach function in an orderly manner, and digestion and absorption are normal. On the other hand, if liver qi is stagnant and the regulatory function is impaired, it can lead to stagnation of the spleen and stomach qi, resulting in symptoms such as fullness in the chest and ribs, abdominal distension and pain, belching and acid reflux, and loss of appetite. This is known as 'liver qi invading the stomach' or 'liver stagnation and spleen deficiency. 'On the other hand, normal spleen and stomach function also helps the liver to release qi. If the spleen and stomach are weak, the earth element is weak and the wood element prevails, which can also lead to liver qi stagnation and aggravate spleen and stomach dysfunction.

(3) The relationship between the kidneys and the gastrointestinal tract: The kidneys are the foundation of innate constitution, storing essence and governing bone marrow production. The brain is the sea of marrow, hence the kidneys and brain are closely related. At the same time, the yang energy of the kidneys has a warming effect on the transport and transformation functions of the spleen and stomach, serving as the source of energy for their transport and transformation. If kidney yang is deficient, it cannot warm the spleen yang, leading to spleen-kidney yang deficiency, which may result in symptoms such as abdominal pain, diarrhoea, and early morning diarrhoea. In addition, the spleen and stomach transport and transform water and grain essence, generate qi and blood, nourish the essence and qi in the kidneys, and maintain normal kidney function.

## 4. Pathogenesis of FGIDs Accompanied by Emotional Disorders

### 4.1 Western Medicine's Understanding of the Pathogenesis of FGIDs Accompanied by Emotional Disorders

In recent years, with the in-depth study of the 'brain-gut axis' theory, Western medicine believes that the pathogenesis of functional gastrointestinal disorders (FGIDs) accompanied by emotional disorders can be systematically explained through the interaction of the neuroendocrine-immune network and the gut microbiota. The brain-gut axis is a bidirectional communication network connecting the central nervous system and the enteric nervous system, and its dysfunction is considered to be the core mechanism of FGIDs accompanied by emotional disorders [16]. The coordinated regulation of the nervous, endocrine, and immune systems is the foundation for the brain-gut axis to achieve homeostasis regulation in the body. Dysfunction of the brain-gut axis inevitably leads to abnormal coordination among the three systems, thereby causing the occurrence of functional gastrointestinal disorders (FGIDs) accompanied by emotional disorders. Anxiety and depression can affect autonomic nervous function imbalance in patients through the brain-gut axis, thereby exerting a significant impact on gastrointestinal function [17, 18]. In the autonomic nervous system, when the excitability of the vagus nerve system increases, it stimulates parietal cells and G cells to secrete more gastric acid, thereby promoting gastrointestinal motility and digestive function. Conversely, when the sympathetic nervous system is excited, gastrointestinal motility decreases, gastrointestinal blood flow and perfusion decrease, and gastric mucosal blood vessels constrict, leading to a series of clinical symptoms such as indigestion and abdominal distension [19-22]. Xu [23] and others found that FGID patients with anxiety or depression had an imbalance in the coordination between the sympathetic and vagus nerves and autonomic dysfunction. FGID patients had abnormal amplification of visceral sensory signal processing in the central nervous system, while intestinal signals affected the limbic system through the vagus nerve and spinal afferent pathways, leading to emotional regulation disorders [24].

In terms of endocrinology, the hypothalamic-pituitary-adrenal (HPA) axis is an important pathway for regulating the neuroendocrine system. Under stress conditions, the HPA

axis is activated, releasing corticotropin-releasing factor (CRF), adrenocorticotropic hormone (ACTH), and cortisol, which act on the corresponding receptors on intestinal mucosal mast cells, leading to damage to the intestinal mucosa. Simultaneously, this triggers the excessive release of serotonin, prostaglandins, and other mediators, further intensifying the body's stress response and triggering visceral hypersensitivity, which contributes to the development of FGIDs [25]. At the same time, as an important neurotransmitter in the brain, serotonin plays a significant role in regulating emotional activity and memory, as well as maintaining brain function. Chen [26] compared plasma 5-HT levels in normal individuals, individuals with obsessive-compulsive disorder, and individuals with anxiety disorders and found that 5-HT levels were significantly elevated in individuals with anxiety disorders. Long-term stress can cause HPA axis dysfunction and abnormal cortisol secretion, which affects the mucosal barrier function, immune function, and synthesis and metabolism of neurotransmitters in the gastrointestinal tract, thereby triggering FGIDs and mood disorders.

In terms of immunity, the intestinal mucosal immune system is an important component of the body's immune system. In patients with FGIDs, intestinal mucosal immune function is abnormal, with increased inflammatory cell infiltration and elevated levels of inflammatory factors such as interleukin (IL) and tumour necrosis factor (TNF). These inflammatory factors not only directly damage the gastrointestinal mucosa but can also act on the central nervous system (CNS) via the bloodstream or neural pathways, affecting brain neurotransmitter metabolism and neural plasticity, thereby contributing to the development of emotional disorders. In addition, dysbiosis of the gut microbiota and disruption of the microbiome can activate the gut immune system, trigger immune responses in the gut, impair gut barrier function, and thereby induce gut motility disorders and visceral hypersensitivity, exacerbating the severity of FGIDs and mood disorders [27]. It can thus be seen that FGIDs and the occurrence of mood disorders are closely related to brain-gut axis dysfunction and synergistic dysregulation of the neuroendocrine-immune network.

### 4.2 Traditional Chinese Medicine's Understanding of the Pathogenesis of FGIDs Accompanied by Emotional Disorders

Although traditional Chinese medicine does not have a specific diagnosis for functional gastrointestinal disorders accompanied by emotional disorders, the symptoms can be categorised under traditional Chinese medicine terms such as 'fullness and distension,' 'diarrhoea,' 'epigastric pain,' and 'depression.' The pathogenesis involves the interaction between the functions of multiple organs and emotional factors. From a holistic perspective, TCM theory posits that the onset of FGIDs with emotional disorders is primarily associated with congenital constitutional deficiencies, irregular diet, emotional distress, and overwork leading to spleen damage. The pathological location is in the gastrointestinal tract, with the root cause in the spleen, and it is closely related to the liver, heart, and kidneys. The Huangdi Neijing states that 'the spleen is the foundation of postnatal life' and 'the source of qi and blood production.' If there is a deficiency in congenital endowment or improper postnatal diet, it can damage spleen qi, impair spleen function, and lead to a lack of qi and blood production. This can result in inadequate nourishment of the stomach and intestines, manifesting as stomach pain and abdominal pain. If the ascending and descending functions of the spleen and stomach are obstructed, it can lead to stomach distension and abdominal distension, among other symptoms. The Suwen states, 'Excessive thinking leads to qi stagnation.' Excessive thinking can easily lead to spleen qi stagnation, resulting in impaired transformation and transport, which manifests as epigastric fullness, loss of appetite, and loose stools. The Jiyin Gangmu states, 'Spleen qi transforms into blood in the heart, and the heart's functions also rely on spleen qi for transformation and generation.' The heart governs the spirit, presiding over human mental, conscious, and cognitive activities. Human mental activities depend on the nourishment provided by the qi and blood generated by the spleen and stomach. When the spleen and stomach functions are abnormal and there is insufficient production of qi and blood, the heart and mind are not nourished, resulting in emotional disorders. The liver and spleen are closely related in their ascending and descending transport and transformation functions. The liver and spleen coordinate with each other physiologically. Normal liver function helps the spleen's transport and transformation; adequate spleen transport and transformation of water and grain essence nourishes the liver and facilitates its transport and transformation. Emotional distress, such as prolonged anxiety, depression, or anger, can lead to impaired liver qi regulation and stagnation of qi. When spleen qi fails to ascend, it may cause dizziness and diarrhoea; when stomach qi fails to descend, it may result in hiccups, belching, and abdominal distension. If liver qi is stagnant and disrupts the spleen, or if spleen qi is deficient and earth qi is weak, leading to wood qi overacting, symptoms such as belching, acid regurgitation, chest and rib fullness, abdominal pain, and diarrhoea may occur. The kidneys are the root of congenital essence, and kidney yang is the foundation of yang qi throughout the body, with the function of warming and nourishing the internal organs. The transport and transformation functions of the spleen and stomach depend on the warming and nourishing action of kidney yang, which serves as the primary source of energy for their transport and transformation processes. The Complete Works of Jingyue states, 'Spleen and stomach deficiency and cold... cannot be treated without the fire of the gate of life.' If the disease persists for a long time without healing, spleen yang deficiency will affect kidney yang, leading to spleen and kidney yang deficiency, with symptoms such as cold pain in the epigastrium and abdomen, bloating after eating, diarrhoea, and early morning diarrhoea. At the same time, kidney yang deficiency and yang qi not reaching the whole body can cause the body to lose its warmth, leading to mental fatigue, low mood, fear of cold, laziness, and other pathological conditions.

## 5. Traditional Chinese Medicine Treatment for FGIDs Accompanied by Emotional Disorders

Traditional Chinese medicine (TCM) is based on the principles of holistic thinking and syndrome differentiation and treatment. By adjusting the balance of yin and yang, the

circulation of qi and blood, and the functions of the internal organs, TCM can simultaneously regulate the central nervous system and gastrointestinal functions, modulate the secretion of neurotransmitters and gastrointestinal hormones, improve gastrointestinal motility, reduce visceral hypersensitivity, alleviate anxiety and depression, achieve 'brain-gutsynchronisation,' and thereby achieve the goal of treating both the mind and body. In clinical practice, treatment methods are diverse, and clinical efficacy is significant. Commonly used therapies include the following:

### 5.1 Liver and Spleen Regulation Method

The liver is responsible for regulating the flow of qi and is closely related to the digestive functions of the spleen and stomach. Emotional distress can easily lead to stagnation of liver qi, which can then invade the spleen and cause digestive dysfunction, resulting in FGIDs accompanied by emotional disorders. Numerous studies have shown that liver qi stagnation and spleen deficiency are common in patients with FGIDs [28]. The experimental results of Liu Wei'ai [29] et al. showed that in rats with liver qi stagnation and spleen deficiency, the levels of motilin (MTL) and gastrin (GAS) decreased, while the levels of vasoactive intestinal peptide (VIP) increased, and gastric emptying and small intestinal propulsion slowed significantly. Multiple studies have shown that focusing on 'regulating the liver and spleen' and coordinating the liver and spleen can effectively improve the overall digestive symptoms of FD patients [30, 31]. Tang Xudong [32] and others found that liver depression and spleen deficiency syndrome are closely related to gastrointestinal motility disorders. They believe that using liver-soothing and spleen-strengthening methods may restore gastrointestinal motility by increasing the levels of motilin (MTL) and gastrin (GAS) in serum, reducing the levels of vasoactive intestinal peptide (VIP), and repairing the morphology and function of ICC. Wang Zhengfang [33] conducted a randomised controlled clinical trial and found that the Liver-Spleen Regulation Method was effective in treating diarrhoea-predominant irritable bowel syndrome (IBS), outperforming the Western medicine piperazine bromide. It improved the total symptom score and reduced the IBS symptom score.

### 5.2 Method for Regulating the Heart and Mind

Gastrointestinal dysfunction is often induced by psychological factors, and anxiety and depression are important risk factors for FGIDs. Traditional Chinese medicine holds that the heart governs the mind, and excessive thinking can damage the spleen, leading to irregularities in the ascending and descending functions of the spleen and stomach, which in turn can cause gastrointestinal symptoms. Damage to the mind can also exacerbate FGID symptoms through the brain-gut axis. Professor Zhou Fusheng was the first to propose the theory of 'heart-stomach correlation' and suggested that the regulatory role of the mind plays a certain role in functional gastrointestinal disorders [34]. The 'heart' refers to the function of the heart in governing the mind, while the 'stomach' refers to the spleen and stomach and the entire digestive system. The influence of the heart on the stomach is more focused on the heart's function in governing the mind, i.e., the impact of emotions on the spleen and stomach system. The theory of 'heart-stomach connection' is consistent with the regulation of the gastrointestinal tract by the neuroendocrine system and psychosomatic factors in modern medicine, and is consistent with the brain-gut interaction theory [35]. In the treatment of functional gastrointestinal disorders accompanied by emotional disorders, ancient and modern medical practitioners have unique insights into the use of the 'heart-spleen regulation and tonification method,' achieving certain therapeutic effects and research results. Experimental studies have found [36] that Guipi Tang exerts its antidepressant effects by increasing the levels of 5-hydroxytryptamine (5-HT) and noradrenaline (NE) in the rat brain. Based on the theory of 'heart-stomach correlation,' Professor Huang Shaogang proposed treating irritable bowel syndrome (IBS) from the perspective of the 'three blood organs.' The Chinese herbal medicine compound he developed, Intestinal Stimulant, can improve bowel satisfaction in IBS-D patients and improve their quality of life and mental state scores [37, 38].

### 5.3 Acupuncture Therapy

Acupuncture, a traditional Chinese medicine therapy based on meridian theory, stimulates specific points on the body to regulate blood circulation and organ function. It has demonstrated unique advantages in the treatment of functional gastrointestinal disorders (FGIDs) accompanied by emotional disorders. In recent years, with further research, the effectiveness and mechanisms of acupuncture have been increasingly revealed. Zusanli is a commonly used acupoint for acupuncture treatment of FD [39]. Research has confirmed [40] that acupuncture at Zusanli and Neiguan can effectively improve gastrointestinal motility in patients with FD and promote digestion and absorption. Research has found [41] that the use of 'acupoint pairing' (i.e., acupuncture + moxibustion on both sides of the 'Neiguan,' 'Zusanli,' and "Guanyuan" acupoints) and conventional acupoint pairing (i.e., acupuncture + moxibustion on both sides of the 'Tianshu,' 'Zusanli,' 'Shangjuxu') can reduce the levels of colonic myosin MYH1 and MLC1 in IBS-D model rats, improve abnormal gastrointestinal motility, and restore gastrointestinal contractility. The 'target and collateral point combination' was more effective than the conventional point combination. Peng Kunming [42] et al. divided 90 patients with FD accompanied by anxiety and depression into two groups. The control group was administered domperidone tablets and fluvoxamine maleate tablets orally, while the study group received acupuncture in addition to the above medications (acupoints: Zusanli, Neiguan, Gan Shu, Dan Shu, Zhongwan, Zhongwan acupoints, combined with moxibustion on Zhongwan and Diao Shu acupoints). The results showed that the study group had lower symptom scores and anxiety-depression self-assessment scores than the control group, with a higher overall efficacy rate. Ma Gang [43] Research shows that transcutaneous electrical nerve stimulation can improve gastric receptivity, vagus nerve activity, autonomic nervous system dysfunction, and vagus nerve activity, thereby alleviating FD-related symptoms. In addition, gut microbiota imbalance is also associated with the occurrence of FGIDs. Acupuncture has a positive effect on the gut microbiota, effectively adjusting the composition of gut microbes and optimising the gut environment. The combination of spleen-tonifying and qi-enhancing

acupuncture techniques with electroacupuncture stimulation of acupoints such as 'Tianshu,' 'Guanyuan,' and 'Sanyinjiao' can effectively reduce the relative abundance of Firmicutes, Pseudomonadales, and Bacillales in obese mouse models, thereby helping to restore intestinal microbiota balance [44].

## 6. Summary

The core mechanism of FGIDs accompanied by emotional disorders lies in the dysfunction of the brain-gut axis and the imbalance of the NEI network. Traditional Chinese medicine theory profoundly explains the close relationship between the brain and the intestines through its holistic concept, meridian theory, and organ-related theory, which is highly consistent with modern medicine's 'brain-gut axis' theory. Traditional Chinese medicine, with its multi-faceted and multi-pronged approach, has gained a certain advantage in the treatment of FGIDs accompanied by emotional disorders. This paper systematically analyses the pathogenesis, treatment, and research progress of FGIDs accompanied by emotional disorders based on the brain-gut axis theory, with the aim of providing theoretical guidance for the clinical treatment of FGIDs accompanied by emotional disorders, promoting the standardised application of traditional Chinese medicine in this field, and providing more precise treatment strategies for patients with FGIDs accompanied by emotional disorders.

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