

MASTERCLASS

## Acupuncture treatment of irritable bowel syndrome

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### Abstract

Irritable bowel syndrome (IBS) is a functional gastrointestinal disorder characterized by abdominal pain, cramping, and bloating related to the act of defecation. It can occur in as many as 20% of adults and is typically managed with medication to target symptoms. Acupuncture treatment has been shown to be an effective adjunct to standard treatment and should be used following a full patient assessment to highlight potential red flags. The effect of acupuncture on IBS is most likely through changes to the autonomic nervous system, with direct effects targeting the somato-autonomic reflexes, and indirect effect due to emotional responses. Although traditional Chinese medicine (TCM) patterns may be identified during patient assessment, selection of acupuncture points is most commonly related to gastrointestinal tract innervation from a western medical perspective. A general treatment protocol for IBS management is described, with point location and needling methods listed. Research evidence on treatment outcomes is considered.

*Keywords:* acupuncture protocol, autonomic nervous system, clinical reasoning, irritable bowel syndrome.

### The condition

Irritable bowel syndrome (IBS) is a chronic gastrointestinal (GI) disorder, most commonly associated with altered bowel habits and abdominal pain. It is one of a group of conditions referred to as functional gastrointestinal disorders (FGID) or a change in gut-brain interaction, and is the most common functional bowel disorder seen in primary care (Farthing 1995). These disorders may affect several parts of the GI tract, and the outline of the Rome IV classification which provided a consensus on terminology in these conditions is shown in Table 1.

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**Table 1.** Rome IV classification of functional gastrointestinal (GI) disorders

- A. Oesophageal disorders
- B. Gastroduodenal disorders
- C. Bowel disorders
  - C1. Irritable bowel syndrome (IBS)
    - IBS with predominant constipation (IBS–C)
    - IBS with predominant diarrhoea (IBS–D)
    - IBS with mixed bowel habits (IBS–M)
    - IBS unclassified (IBS–U)
- D. Centrally mediated disorders of gastrointestinal pain
- E. Gallbladder and sphincter of Oddi disorders
- F. Anorectal disorders
- G. Childhood functional GI disorders: neonate/toddler
- H. Childhood functional GI disorders: child/adolescent

Data from Drossman 2016.

IBS is a subgroup of bowel disorders and is described in four categories reflecting predominant symptoms. The condition affects the digestive system, changing bowel habits and

**Table 2.** Diagnostic criteria and red flags for irritable bowel syndrome (IBS)

Recurrent abdominal pain on average 1 day / week in the last 3 months	Red flag symptoms in IBS
Pain associated with two or more of the following: <ul style="list-style-type: none"><li>• Defecation</li><li>• Change in frequency of stool</li><li>• Change in appearance of stool</li></ul>	<ul style="list-style-type: none"><li>• Unexplained weight loss</li><li>• Rectal bleeding</li><li>• Change in bowel habit in patients under 60 years of age</li><li>• Family history of bowel/ovarian cancer</li><li>• Anaemia</li><li>• Abdominal/rectal/pelvic mass</li><li>• Raised inflammatory markers</li></ul>

Data from Lacy & Patel 2017; Aziz 2012

causing abdominal pain and cramping, bloating, and giving feelings of general discomfort. Diagnostic criteria for the condition (Lacy & Patel 2017) are shown in Table 2. Diagnosis is confirmed with abdominal pain at least once per week over a 3-month period related to the act of defecation and a change in either frequency or appearance of stool.

IBS can occur in some form in about 15–20% of adults and is often treated with medication which helps alleviate symptoms. Typically, drugs aim to reduce feelings of cramp (antispasmodics), depression (antidepressants), constipation (activators to increase bowel secretions) or diarrhoea (antibiotics). However, many of these drugs carry risks such as cardiovascular events and have been shown to have only modest effects when compared to placebo (Manheimer 2012). In addition, as symptoms typically recur, medication may be needed long term to manage the condition over time.

The exact cause of IBS is not known, but it has been linked to diet, stress, family history and oversensitivity of the nerves controlling the bowel. Medical investigations include blood tests to rule out coeliac disease (inflammation of the small bowel as an adverse reaction to gluten) and a stool sample to check for infections or inflammation. Where red flag symptoms are found, further investigation such as colonoscopy, ultrasound scan, blood and stool tests may be required. Red flag symptoms include unexplained weight loss, rectal bleeding, change in bowel habit in patients under 60 years, family history of bowel or ovarian cancer, anaemia, abdominal/rectal/pelvic mass and raised inflammatory markers (Aziz 2012).

## **Acupuncture effects on the autonomic nervous system**

The autonomic nervous system (ANS) is responsible for the unconscious control of bodily functions such as digestion, respiration and circulation. The ANS supplies the internal organs and has two main divisions, sympathetic and parasympathetic. In general terms, the sympathetic system speeds up metabolic processes (fight or flight) while the parasympathetic slows them down (rest and digest). These effects are brought about via the neurotransmitters acetylcholine and noradrenaline. Broadly speaking, nerve fibres which secrete acetylcholine (cholinergic) have parasympathetic or inhibiting effects, while those secreting nor-adrenaline (adrenergic) have sympathetic or stimulating effects. The ANS is specialized around the GI tract to form the enteric nervous system (ENS). The ENS regulates GI tract functions including muscular, neuro-hormonal and secretory effects. It consists of a meshwork of fine nerves wrapped around the oesophagus, stomach and intestines, and can act independently of the rest of the ANS. It has two main functions, brought about by different sets of nerve fibres. Absorption and secretion are stimulated via the submucosal plexus, while intestinal movement or motility occurs through the myenteric plexus (Jahng & Kim 2016). In IBS, changes to the functioning of this system may result in an alteration of the intestinal stress response leading to an up-regulation of the neural processing between the brain and gut (Mertz 2002).

Autonomic regulation of viscera comes about mainly via two effects. Changes in emotions may result in an indirect alteration in heart rate,

blood flow or organ secretion, while impulses from peripheral sensory receptors located within the organs themselves cause direct alteration via reflex changes in the organ efferent nerves (somato-autonomic reflexes). Stimulation of acupuncture points (manual or electrical) within muscle tissue has been shown to produce several neuropeptides including substance P, calcitonin gene-related peptide (CGRP), vaso-intestinal peptide, and nerve growth factor (NGF). These in turn modulate spinal cord signals at the same segmental level and transmits signals to the brain leading to descending modulation (Stenner-Victorin 2016). Organ function at the same innervation level may alter as a result (Sato *et al.* 1997). In anaesthetized rats' acupuncture-like stimulation of the abdominal region (cutaneous and muscular) has been shown to inhibit gastric motility and tone, while stimulation of the limbs excites motility. The autonomic reflexes associated with these changes resulting from efferent pathways in both segmental and non-segmental regions (Sato *et al.* 1994). Low frequency electroacupuncture (EA) leads to the release of several neuropeptides, serotonin, endogenous opioids and oxytocin within the CNS which may cause changes in different organ systems. In turn,  $\beta$  endorphin released from the pituitary gland, hypothalamus and brain stem (nucleus tractus solitarius) has been shown to mediate autonomic function, changing sympathetic tone (Stenner-Victorin 2016).

Indirect effects of acupuncture on IBS may be achieved by targeting stress/emotional responses. These autonomic responses are typically assessed by monitoring heart rate variability (HRV) a measure of the interval between heartbeats. Acupuncture at the point Large Intestine (LI) 4 for 25 min has been shown to reduce heart rate (HR) through a sympathetic effect which remained for the 60 min post-treatment observation period (Haker *et al.* 2000) and to reduce heart rate variability (HRV) through decreased sympathetic activity in migraine sufferers (Backer *et al.* 2008). HRV has been shown to significantly decrease using real acupuncture (compared to sham) at the points LI 4 and Spleen (SP) 6 (Kim *et al.* 2011). Measurement of HRV (low to high frequency ratio or LF/

HF) before, during and following stimulation (1 Hz for 2 min) at the acupuncture point Large Intestine (LI) 10 showed a significant reduction of HR and LF/HF ratio of HRV through autonomic regulation (Uchida *et al.* 2018).

## Traditional Chinese medicine patterns in IBS

Traditional Chinese medicine (TCM) incorporates herbal medicine, acupuncture, massage techniques, exercise and dietary therapy. Broadly speaking, an attempt is made during patient diagnosis to identify a pattern of disharmony between the body systems and the environment. Patient examination includes subjective and objective measures as with Western medicine, but rather than special tests or investigations, pulse and tongue diagnosis is typically used. Interaction with the environment includes concepts of yin and yang and the five elements, while body functions include Qi (vital energy), Xue (blood), Jinye (body fluids) and Zang-fu (body organs). In addition, the concept of the environment influencing the body through "*invasion of pathogens*" (such as damp, wind, heat and cold) is important to musculoskeletal pain especially. TCM patterns often reflect these factors with names such as "*cold dampness*" or "*stagnation of Liver Qi*", and the patterns (and symptoms leading to their recognition) typically described in a patient with IBS are listed in Table 3. In a TCM approach, acupuncture points would be selected based on the pattern recognized, with the aim of unblocking the meridians and collaterals, strengthening body resistance and eliminating pathogenic factors, and regulating yin and yang (Bing & Hongcai 2011). For example, where cold is a pathogen, Conception Vessel (CV) 6 (known as the Sea of Qi) may be used to warm the abdomen, and Liver Qi may be promoted using Liver (LR) 3 (source point of the liver channel) in the foot or locally using LR 14 (front mu point of the liver) in the lower ribcage. In cases where heat is suspected as a pathogen, LI 4 is often used to 'clear heat', while the point Stomach (ST) 36 (command point of the abdomen) is commonly used to strengthen the stomach organ.

**Table 3.** Traditional Chinese medicine (TCM) treatment of irritable bowel syndrome (IBS)

TCM pattern	Symptoms	Example acupuncture points
Cold dampness	Loose watery stool. Stomach bloated. White tongue coating	CV 6 to warm the abdomen (middle burner)
Damp heat	Diarrhoea. Red/yellow coating to tongue	LI 4 and ST 39 to clear heat and eliminate dampness
Stagnation of Liver Qi	Anxiety and depression related. Frequent bowel movement	LR 14, LR 3 to sooth Qi
Spleen and Stomach Qi deficiency	Loose stools, tiredness, abdominal pain. Pale tongue	ST 36, BL 20 to strengthen the stomach and spleen
Kidney yang deficiency	Patient cold and pale. Abdominal pain	BL 23, GV 4, CV 4 to warm the kidney

Data from Bing & Hongcai 2011; Li *et al.* 2013. CV=Conception Vessel; LI=Large Intestine; ST=Stomach; LR=Liver; BL=Bladder; GV=Governor Vessel

In a study looking at the major patterns (syndromes) of IBS patients treated with Chinese herbal medicine, the most common type was liver and spleen deficiency (56.8%), followed by spleen-stomach weakness (49.4%), spleen-kidney yang deficiency (48.1%), and cold and heat in complexity (29.6%) (Li *et al.* 2013).

### Acupuncture point selection

Acupuncture points may be selected in the same somatic area as the affected organ (viscerotome) to target direct reflex activity of the organ itself. Sympathetic preganglionic innervation of the GI tract is from the mid thoracic to upper lumbar regions (T5-L2), while parasympathetic preganglionic innervation is from the Vagus nerve and the sacrum region for the lower colon (S2-S4). Acupuncture points on the inner Bladder line on the back, or the Stomach or Conception Vessel on the abdomen, at the level of the painful segment may be used.

Additionally, points may be selected to target stress responses, anxiety and depression to mediate an indirect effect on the IBS condition. Acupuncture has been used extensively in the treatment of depression and shown to be associated with short to medium term benefits to the same degree as counselling (MacPherson *et al.* 2013). Clinical reasoning of acupuncture point selection is dependent on patient symptoms. Local points targeting the viscera include Conception Vessel (CV) 12 and Stomach (ST) 25, or painful abdominal points to palpation. Electroacupuncture at points ST 25 (and ST 37) in rats with IBS has been shown to down regulate the expression of mucosal mast cells,

substance P (and its receptor) in the colon, and corticotropin-releasing hormone from the hypothalamus (Ma *et al.* 2009). Pericardium (PC) 6 may be used for nausea, while LI 4, LR 3 (the “Four Gates”) are often used as harmonizing points in TCM and may have a strong clinical effect due to the larger representation of the hand and foot in the homunculus compared to the rest of the body. Governor vessel (GV) 20 and Heart (HT) 7 are often used points where patients are anxious, and ST 36 and Spleen (SP) 6 are commonly used points to affect the autonomic nervous system and have been proposed to have a marked effect on vagal tone (White *et al.* 2018). In TCM SP 8 may be used as an alternative to SP 6 where abdominal distension accompanies changes to menstruation.

A general protocol for the acupuncture treatment of IBS was developed by Reynolds *et al.* (2008) who looked at the most common points generally used for treatment of this condition by acupuncturists (Table 4). Anatomical location and needling techniques for these points is

**Table 4.** Acupuncture points commonly used in IBS treatment

Point	Common usage (%)	Body region
ST 36	48	Outer shin
PC 6	20	Lower forearm
LI 4	19	Thumb web
SP 6	17	Lower inner shin
SP 8	17	High inner shin
KI 3	17	Inner ankle
CV 12	17	Upper abdomen
LR 3	16	Forefoot
LI 11	16	Outer elbow

Data from Reynolds 2008. ST=Stomach; PC=Pericardium; LI=Large Intestine; SP=Spleen; KI=Kidney; CV=Conception Vessel; LR=Liver; LI=Large Intestine



covered elsewhere (Norris 2001; Norris 2011). Points are generally needled bilaterally, and the points are stimulated until De Qi (sensory propagation along the acupuncture channel) is felt. Needles are typically retained for 20 min and may be gently warmed either using a heat lamp, or traditionally using moxa attached to the needle.

## Research on acupuncture in the treatment of IBS

Patients often report anecdotally that acupuncture helps alleviate some of their IBS symptoms. Using research to assess and quantify these effects, several studies have been performed. A Cochrane review (Manheimer *et al.* 2012) looked at 17 randomized controlled trials (RCTs) which drew on the experience of over 1800 patients. Some studies compared real acupuncture to sham acupuncture, while others compared acupuncture to antispasmodic drugs commonly used in IBS treatment. Acupuncture offered greater benefits than the drugs, but when compared to sham, real acupuncture offered no greater benefit. This may question the suitability of the sham or suggest that the effect of acupuncture was more psychological (placebo effect) than physiological (structural change).

Studies since this Cochrane review have shown different results. A pragmatic RCT looked at 233 patients and showed a significant difference favouring the acupuncture group over usual care (drugs or advice), with the acupuncture group being in total 18% better and the effect persisting at 6 and then 12 months following treatment (MacPherson *et al.* 2012). In a later follow up at 24 months, there were no statistically significant differences between acupuncture and usual care (MacPherson *et al.* 2017) suggesting that acupuncture treatment needs to continue. Additionally, these authors suggested that as the effects were largely maintained from 3 months through to 24 months, “*the apparent benefits of acupuncture represent more than a simple placebo response. Longer-term effects are likely to be associated with the underlying physiological mechanisms of action.*”

## Recommendations

The evidence for the use of acupuncture in the management of IBS comes from research, patient experience and practitioner opinion, the foundations of evidence-based practice. The available evidence does not indicate that acupuncture is the best treatment for this condition but does show that it is at least equivalent to current standard care. As such it may be argued that acupuncture should be offered as a treatment option to enable patients to make an informed choice. If this is the case, the question then falls to which practitioners are best equipped to offer this treatment. Physiotherapists do not routinely treat IBS as it is a medical condition which may be interpreted as outside their scope of practice, and more suitable for management by a general practitioner (GP). However, given that treatment may combine lifestyle advice with acupuncture treatment which appears to have at least some of its effect through muscle and nerve stimulation, physiotherapists would seem the ideal choice providing patient assessment is of a high standard and includes the identification of red flags with the potential for onward referral to secondary care. The move of physiotherapists into extended scope posts and the number of first line practitioners within private settings provides a significant number of practitioners able to identify and manage this common and potentially disabling condition.

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**Appendix.** Point locations and needling method

Point (code)	Location (surface anatomy and cun measurement)	Needling method (traditional)	Relevant anatomy (muscle and myotome)
ST 36	Below the knee, 3 cun inferior to the lateral infrapatellar sulcus (ST 35) and 1 finger width lateral to the anterior crest of the tibia	Perpendicular insertion 1 to 1.5 cun*	Tibialis anterior muscle (L4/L5)
PC 6	On the flexor aspect of the forearm, 2 cun proximal to the wrist crease (PC 7)	Perpendicular insertion 0.5 to 1 cun or oblique insertion up to 1.5 cun	Flexor digitorum superficialis muscle and median nerve (C7/C8)
LI 4	On the dorsum of the hand, between the 1 <sup>st</sup> and 2 <sup>nd</sup> metacarpal bones. Level with the midpoint of the 2 <sup>nd</sup> metacarpal bone	Perpendicular insertion 0.5 to 1 cun	1 <sup>st</sup> dorsal interosseous muscle and adductor pollicis (T1)
SP 6	On the medial side of the lower leg, 3 cun proximal to the apex of the medial malleolus. Just behind the medial crest of the tibia	Perpendicular insertion, 1 to 1.5 cun	Flexor digitorum longus muscle (S1/S2)
SP 8	Posterior to the medial crest of the tibia, 3 cun inferior to SP 9	Perpendicular 1 to 1.5 cun	Flexor digitorum longus muscle (L3/L4)
KI 3	In the centre of the depression between the apex of the medial malleolus and the Achilles tendon (Kager's triangle)	Perpendicular insertion 0.5 to 1 cun	Connective tissue space (S2)
CV 12	On the abdominal midline, midway between the umbilicus (CV 8) and sternocostal angle (CV 16)	Perpendicular insertion 0.8 to 1.5 cun	Linea alba (T8)
LR 3	On the dorsum of the foot, in the depression distal to the junction of the first and second metatarsal bones	Perpendicular 0.5 to 0.8 cun	1 <sup>st</sup> dorsal interosseous muscle (S2/S3)
LI 11	Midway between the radial aspect of the biceps tendon (LU 5) and the lateral epicondyle of the humerus, with the elbow flexed.	Perpendicular insertion 1 to 1.5 cun	Extensor carpi radialis muscle (C5/C6)

\*1 cun is the width of the patient's thumb at the distal interphalangeal joint

Data from Norris 2001; Norris 2011. ST=Stomach; PC=Pericardium; LI=Large Intestine; SP=Spleen; KI=Kidney; CV=Conception Vessel; LR=Liver; LU=Lung