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# A Meta-analysis of Acupuncture Treatment for Irritable Bowel Syndrome

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ABSTRACT

To assess the efficacy of acupuncture for treatment of irritable bowel syndrome through meta-analysis of randomized controlled trials in recent 20 years. Online databases, including CNKI, VIP, WANFANG, PubMed, Cochrane Library, Web of Science and Embase were searched for randomized controlled trials (RCTs) of acupuncture for IBS. Retrieval time was from January 1, 2000 to January 31, 2021. According to Jadad scoring criteria, the bias risk and quality assessment of each RCT included were evaluated by two researchers. RevMan 5.3 software was used for the meta-analysis. Eight RCTs were selected which include a total of 1181 patients. The control group has 425 patients and the experimental group has 756 patients. The result of meta-analysis indicates that the total effective rate for the experimental group was superior to that of the control group [OR=3.29, 95%CI [2.16~5.03](P<0.01)], and the funnel plot was basically symmetric. Acupuncture therapy is shown to have a good safety and compliance record. However, the number of high-quality trials is small, and there are some deficiencies in the methodology of clinical research. Acupuncture, as a supplementary therapy for irritable bowel syndrome, has positive clinical significance and prospects for application. The methodology of clinical research needs to be further improved.

## 1. Introduction

Irritable bowel syndrome (IBS) is one of the most common clinical functional gastrointestinal diseases (FGIDs). It is a significant burden to patients in their daily lives, affecting their mental health, ability to work, and general quality of life. Modern medicine has focused its therapies on relieving spasms to improve abdominal pain,

stopping diarrhea, anti-inflammatory measures, promoting gastrointestinal motility, antidepressant treatment, anti-anxiety treatment, etc. However, although IBS symptoms can be significantly improved with these treatment modalities, there are also many adverse reactions. Nowadays, acupuncture therapy is considered to be an effective alternative method to the treatment of IBS, and there are a large number of clinical reports<sup>[1]</sup> to that effect. In order

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to further understand the clinical effects and other aspects of acupuncture for IBS, we have collected relevant clinical research literature from January 2000 to January 2021, from China and other countries, evaluated the quality of the clinical literature relating to acupuncture for IBS, and present the resulting meta-analysis of its efficacy in this paper.

## 2. Materials and Methods

### 2.1 Materials

#### 2.1.1 Literature Sources

Online databases, including CNKI, VIP, WANFANG, PubMed, Cochrane Library, Web of Science and Embase were searched for published randomized controlled trials (RCTs) of acupuncture for IBS.

#### 2.2 Literature Retrieval

Key words: irritable bowel syndrome, acupuncture, electroacupuncture, acupoint. Retrieval time was from January 1, 2000 to January 31, 2021.

#### 2.3 Inclusion Criteria

①According to the Rome III criteria revised by the Rome Committee of functional gastrointestinal diseases in 2006, the patient was definitely diagnosed as having irritable bowel syndrome (IBS); ②Randomized controlled trials (RCTs) were described; ③Acupuncture therapy was used in the experimental group. Traditional Chinese medicine therapy and Western medicine therapy that does not include acupuncture were used in the control group. ④The course of treatment should be at least once a week. According to the specific situation, if the same or similar research reports were presented in the same group or similar group, we have only chosen one.

#### 2.4 Exclusion Criteria

①Patients who were not diagnosed definitely as having irritable bowel syndrome, and did not meet the Rome III criteria; ②Dissertations, animal experimental literature, review literature, case reports, experience-based reports, and repeated published literature (*i.e.* additional versions of the same literature/study) were excluded; ③Retrospective study of cases; ④Patients who have a severe disease of the intestines or have other serious diseases; ⑤Acupuncture therapy was not mentioned in the literature or the acupuncture therapy is the complementary therapy; ⑥The number of cases was fewer than 20 in experimental group or control group; ⑦Massage, scalp acupuncture, ear acupuncture, abdominal acupuncture and

other micro-needle literature. Those who met any one of the above criteria were not included in the study.

### 2.5 Outcome Measures

① Main outcome measures: clinical efficacy (total effective rate), irritable bowel syndrome severity scale (IBS-SSS); ② Secondary outcome measures: symptom score, irritable bowel syndrome quality of life scale (IBS-QOL), Self-Rating Anxiety Scale (SAS) and Self-Rating Depression Scale (SDS), Hospital Anxiety and Depression Scale (HADS), Bristol scale, quality of life, sleeping score, security, adverse reactions, etc.

### 2.6 Data Collection and Quality Evaluation

First of all, we read the title and abstract for the first time, eliminated the conference papers, dissertations and other literature that do not meet the inclusion criterion, and then read the full text carefully for further screening. If there are repetitive published studies in different languages, only the Chinese literature has been reserved. Two researchers screened the literature and extracted relevant data independently, cross-checked their data, and negotiated with the third-party review group for uncertain and fuzzy decisions. Jadad scoring criteria were used to evaluate the quality of the literature. The final included literature was divided into low-quality literature (1-3 points) and high-quality literature (4-7 points). The evaluation contents include: ①whether to use the appropriate random grouping method to generate random sequence; ②whether to use allocation concealment, whether the description is clear and the method is appropriate; ③whether to use blinding and whether the specific method is appropriate; ④whether to describe the numbers and reasons of patients who quit the study or where there was loss of follow-up.

### 2.7 Statistical Method

Meta-analysis: Revman 5.3 software was used for statistical analysis. Odds ratio (OR) and 95% confidence interval (CI) were used for count data, and weighted mean difference (WMD) and 95% confidence interval (CI) were used for measurement data. The heterogeneity of each group was analyzed by  $\chi^2$  test and  $I^2$  test. Studies with  $I^2$  of 25% to 50% were considered to have low heterogeneity, studies with  $I^2$  of 50% to 75% and more than 75% were considered to have moderate and high heterogeneity respectively. If the heterogeneity was not significant (heterogeneity < 0.1), the fixed effect model was used to merge the studies.  $P < 0.05$ .

Literature quality evaluation: Revman 5.3 software was used to evaluate the methodological quality of the included studies.

### 3. Results

#### 3.1 Literature Quality Analysis

##### 3.1.1 Literature Retrieval

At first, 4190 articles were retrieved from a Chinese database and 135 articles were retrieved from foreign databases, with a total of 4325 articles. Then, following the inclusion criterion, exclusion criterion, and Jadad scoring criteria strictly, eight high-quality (4-7 points) RCTs were selected from 315 articles<sup>[2-12]</sup> (Figure 1).

##### 3.1.2 Basic Information of Excluded Literature

According to Jadad scale, 307 articles were excluded for different reasons (Table 1).

**Table 1.** Relevant Information of Excluded Literature

Reasons	Number
Unclear generating method of random sequence	279
Inappropriate generating method of random sequence	21
Unclear randomization concealment	96
Inappropriate randomization concealment or not use	203
Unclear blinding	10
Inappropriate blinding	294
Not described the reason of dropouts	290

##### 3.1.3 Basic Information of Included Literature

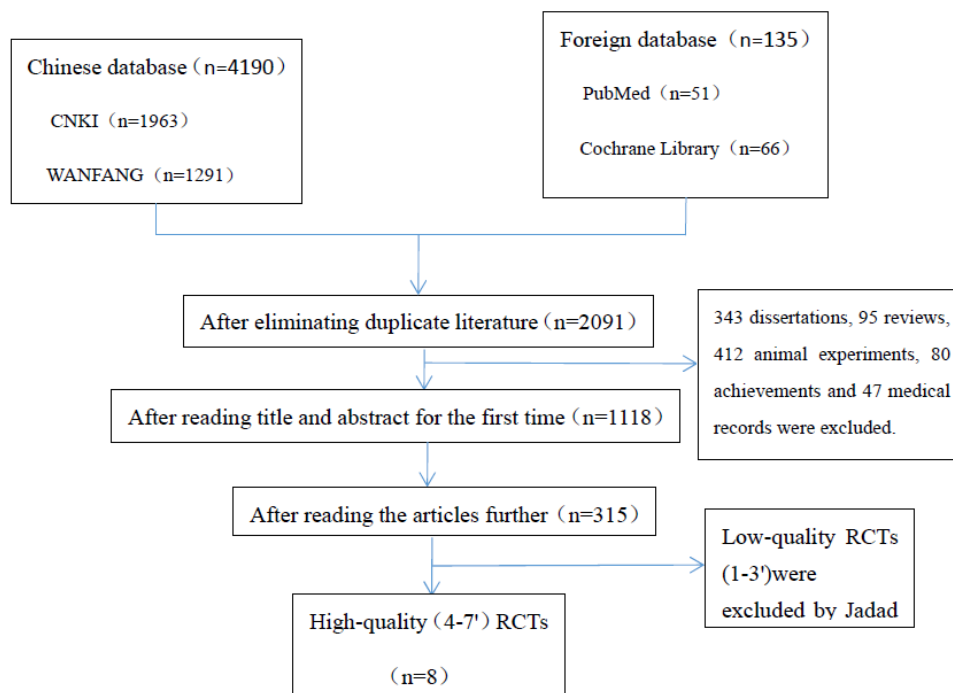
Among the eight included studies with the theme of acupuncture, five<sup>[2-4,6,8]</sup> were in Chinese and three<sup>[5,7,9]</sup> in English. There were 1181 patients, 425 in the control group and 756 in the experimental group. All the studies<sup>[2-9]</sup> used the method of generating random numbers by computer; six papers<sup>[2-3,5,7-9]</sup> used the appropriate randomization concealment method; only two papers<sup>[5,9]</sup> used blinding; and six papers<sup>[2,4,6-9]</sup> described the numbers and reasons of dropouts, withdrawals and discontinued cases. There were different degrees of bias in the aspect of allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data and selective reporting (Figure 2 and Table 2).

##### 3.1.4 Evaluation of Literature Quality

Although there was a large amount of clinical literature on acupuncture for IBS, the overall proportion of high-quality RCTs was not very high. Even for high-quality RCTs, none focused on the health economics of acupuncture for IBS, and only some literature involved an explanation of safety problems, so there were some deficiencies in methodology.

#### 3.2 Curative Effect Analysis

Among the eight clinical studies, only five<sup>[2-4,6,8]</sup> reported the total effective rate of the experimental group

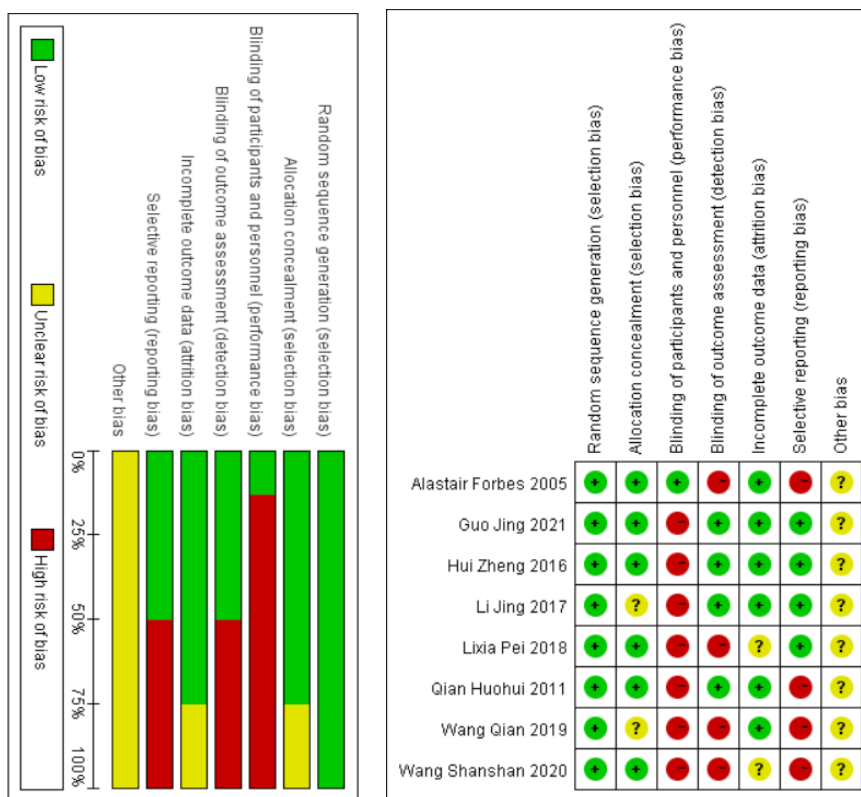


**Figure 1.** Flow Chart of Literature Screening

**Table 2.** Basic Information and Quality Evaluation Table of Included Literature

Trials	Cases Number		Treatment Course	Follow-up	Outcome Measures	Stochastic Method	Allocation concealment	Blinding	Reasons for withdrawal	Jadad Score
	CG	EG								
Guo J,et al 2021 <sup>[2]</sup>	77	154	6w	3 months	①②③	Computer	Appropriate	Not Done	Described Clearly	5'
Wang S,et al (2020) <sup>[3]</sup>	41	41	4w	Not Done	④⑤⑥⑦	Computer	Appropriate	Not Done	Not Done	4'
Wang Q,et al (2019) <sup>[4]</sup>	60	60	4w	Not Done	④⑧	Computer	Unknown	Not Done	Described Clearly	4'
Pei L,et al (2018) <sup>[5]</sup>	20	20	12w	Not Done	①⑨	Computer	Appropriate	Yes	Not Done	6'
Li J, et al (2017) <sup>[6]</sup>	27	54	6w	Not Done	①	Computer	Unknown	Not Done	Described Clearly	4'
Zheng H,et al (2016) <sup>[7]</sup>	112	336	4w	4W	⑩⑪⑫⑬	Computer	Appropriate	Not Done	Described Clearly	5'
Qian H,et al (2011) <sup>[8]</sup>	60	60	4w	Not Done	⑤⑩	Computer	Appropriate	Not Done	Described Clearly	5'
Alastair F, et al (2005) <sup>[9]</sup>	28	31	1w	Not Done	⑬	Computer	Appropriate	Yes	Described Clearly	7'

Notes: ①IBS-SSS ②IBS-QOL ③5-HTTLPR ④TCM syndrome scoring ⑤VIP of serum ⑥MAPK ⑦SAS、SDS ⑧Coliform detection ⑨Visceral pain scale ⑩Stool frequency and character ⑪Life quality ⑫Adverse reactions ⑬Bristol scale



**Figure 2.** Risk Bias Assessment of Methodological Quality

and the control group, and the remaining three<sup>[5,7,9]</sup> did not report the total effective rate. In addition, five trials<sup>[4,6-9]</sup> contained specific descriptions of the improvement of clinical symptoms, and the remaining three trials<sup>[2-3,5]</sup> had no specific description of the improvement of symptoms.

### 3.2.1 Heterogeneity Test

$\chi^2$  test ( $\chi^2 = 2.89$ ,  $P > 0.05$ ),  $I^2 = 0\% < 50\%$ , it can be considered that the five independent similar trials<sup>[2-4,6,8]</sup>

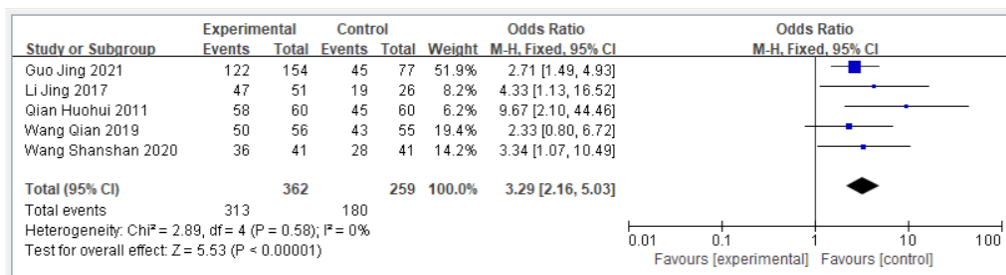
have homogeneity, so the fixed effect model was selected for statistical method (Table 3, Figure 3).

### 3.2.2 Test of Combined Statistics

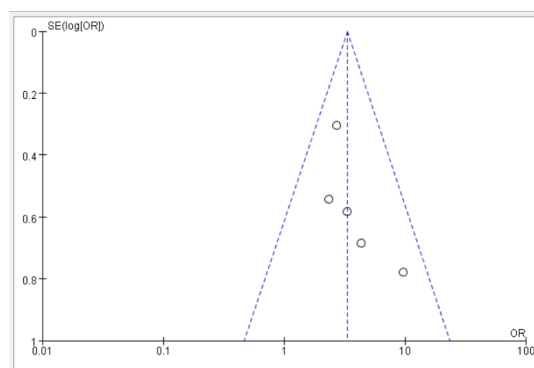
$Z = 5.53$ ,  $P < 0.01$ , with statistical significance. The funnel plot of the five independent similar trials<sup>[1-3,5,8]</sup> is shown in Figure 4: the figures are basically symmetrical, so it could be considered that the bias of the five trials is small (Figure 4).

**Table 3.** Acupoints Selection and Control Scheme of Included Literature

Trials	Treatment Method	Experimental Group	Control Group	Statistical Significance
Guo J, et al 2021 <sup>[2]</sup>	Acupuncture	Baihui, Yintang, Tianshu, Shangjuxu, Zusanli, Sanyinjiao, Taichong	Dicetel p.o	P<0.05
Wang S, et al (2020) <sup>[3]</sup>	Acupuncture and Tongxieyao formula	Shangjuxu, Tianshu, Taichong, Sanyinjiao, Zusanli	Dicetel p.o.	P<0.05
Wang Q, et al (2019) <sup>[4]</sup>	Acupuncture	Tianshu, Zusanli, Shangjuxu, Sanyinjiao, Taichong	TrimebutineMaleate p.o.	P<0.05
Pei L, et al (2018) <sup>[5]</sup>	Acupuncture	Baihui, Yintang, Zusanli, Shangjuxu, Sanyinjiao, Tianshu, Taichong	Sham acupuncture	P<0.05
Li J, et al (2017) <sup>[6]</sup>	Acupuncture	Baihui, Taichong, Shangjuxu, Tianshu, Zusanli, Sanyinjiao, Yintang	Dicetel p.o	P<0.05
Zheng H, et al (2016) <sup>[7]</sup>	Electroacupuncture	Quchi, Shangjuxu, Tianshu, Dachangshu	Loperamide p.o.	P<0.05
Qian H, et al (2011) <sup>[8]</sup>	Acupuncture	Zhongwan, Tianshu, Shangjuxu, Xiajuxu, Neiguan, Taichong, Zusanli, Pishu	Sham acupuncture	P<0.05
Alastair F, et al (2005) <sup>[9]</sup>	Acupuncture	Acupoints selecting based on syndrome differentiation	Sham acupuncture	P<0.05



**Figure 3.** Comparison of the Total Effective Rate Between EG and CG of Five Trials



**Figure 4.** Funnel Plot of Clinical Efficacy of Acupuncture for IBS

### 3.3 Compliance Analysis

Six trials <sup>[2,4,6-9]</sup> described the specific numbers and reasons for dropouts (Table 4).

**Table 4.** The numbers and Ratio of Dropouts

Trials	Control Group			Experimental Group		
	Cases	Dropout numbers	Ratio	Cases	Dropout numbers	Ratio
Guo J, et al 2021 <sup>[2]</sup>	77	11	14.29%	154	8	5.19%
Wang Q, et al (2019) <sup>[4]</sup>	60	5	8.33%	60	4	6.67%
Li J, et al (2017) <sup>[6]</sup>	27	1	3.70%	54	3	5.56%
Zheng H, et al (2016) <sup>[7]</sup>	112	5	4.46%	336	25	7.44%
Qian H, et al (2011) <sup>[8]</sup>	60	0	0%	60	0	0%
Alastair F, et al (2005) <sup>[9]</sup>	28	1	3.57%	31	0	0%
Total	364	23	6.32%	695	40	5.76%

### 3.4 Safety Analysis

Among the eight high-quality RCTs, only four trials <sup>[2,5-7]</sup> included a safety analysis and discussion, and the conclusion was consistent: acupuncture for irritable bowel syndrome has a good safety record.

### 3.5 Health Economics Evaluation

No one discussed the problem of health economics, so we could not compare the economic advantages of acupuncture for IBS.

## 4. Discussion

A survey of worldwide databases turned up a total of 4,325 studies or reports which were initially screened by reading the title and abstract of each study, resulting in 1181 studies being evaluated further. These 1181 studies were read for content, and then evaluated by Jadad scoring criteria. Among them, 307 so-called RCTs were rated as low-quality literature (1-3 points). The specific performances of the low score are as follows: ①The method of generating random sequence is not correct, such as according to the visiting sequence and the date of admission, or the method of randomization allocation is not described. ②The randomized concealment method is not appropriate. For instance, they did not use computer

control or sealed opaque envelopes or other methods that make it impossible for clinicians and subjects to predict the sequence allocation; or the related explanations were not clear enough, they were simply described as using the random number table. ③There was no blinding or lack of detailed description, such as no placebo group in the trial. ④The numbers and reasons of dropouts and withdrawals were not clarified. In fact, there were different degrees of deduction among the eight high-quality papers which were rated as 4-7 points: two of them <sup>[4,6]</sup> did not explain the method of generating randomization concealment; six of them <sup>[2-4,6-8]</sup> did not use blinding; and two of them <sup>[3,5]</sup> did not explain the numbers and reasons of dropouts and withdrawals. At the same time, as shown in Table 1, most trials did not have follow-up for a long time, and the final outcome measures and measurement index of each trial were different, which makes it impossible to evaluate the long-term efficacy of acupuncture for irritable bowel syndrome systematically and scientifically in this paper, which will also have influence on the results of this meta-analysis, more or less.

Among the eight high-quality RCTs included in this paper, the treatment method for the experimental group always involved the use of acupuncture. Among them, six trials <sup>[2,5-9]</sup> were treated with acupuncture alone. One <sup>[3]</sup> included a Tongxie prescription, and one <sup>[4]</sup> included moxibustion (prescription and moxibustion were auxiliary therapies). The treatment method for the control group(s) involved Western Medicine (Dicetel tablets, TrimebutineMaleate tablets and Loperamide tablets) and sham acupuncture. Three trials <sup>[5,8-9]</sup> used sham acupuncture for the control group.

Effectiveness is one of the important criteria when evaluating the usefulness of any treatment or modality. We can confirm the effectiveness of acupuncture for irritable bowel syndrome by meta-analysis. Although we recognize problems or inconsistencies in different aspects of the eight high-quality studies, these problems have no decisive impact on the judgment of effectiveness. The results of meta-analysis showed that the overall efficacy for the experimental group was better than the control group, and there were five trials <sup>[2-4,6,8]</sup> detailing that the total effective rate of the experimental group was better than the control group. Acupuncture therapy can significantly improve clinical efficiency, reduce the recurrence rate, and more obviously relieve abdominal pain, diarrhea, and other clinical symptoms of patients with irritable bowel syndrome.

In short, the clinical literature detailing acupuncture treatment for irritable bowel syndrome has gradually increased in the past decade. Although the high-quality

RCTs account for a relatively small proportion of all relevant literature, the meta-analysis of the existing high-quality RCTs shows that acupuncture treatment has definitely demonstrated clinical efficacy, combined with good compliance and safety for irritable bowel syndrome. There are relatively few high-quality RCTs of acupuncture treatment for this disease, which reflects that the methodology of acupuncture clinical research still has a large space for improvement, especially in the evaluation of long-term efficacy, safety and health economics.

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