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Clinical Study

Effect of heat-sensitive moxibustion plus psychological intervention on SP, 5-HT and quality of life in patients with irritable bowel syndrome

热敏灸配合心理干预对肠易激综合征患者SP、5-HT及生活质量的影响

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Abstract

Objective: To observe the effect of heat-sensitive moxibustion plus psychological intervention on serum contents of substance P (SP) and 5-hydroxytryptamine (5-HT), as well as the quality of life (QOL) in patients with irritable bowel syndrome (IBS).

Methods: A total of 120 IBS patients were divided into three groups by random sampling method, 40 cases in each group. The heat-sensitive moxibustion group received heat-sensitive moxibustion, the psychological intervention group received psychological intervention, while the observation group received both methods. The therapeutic efficacy was evaluated after 3 courses of treatment.

Results: After treatment, the therapeutic efficacy of the observation group was better than that of the heat-sensitive moxibustion group and the psychological intervention group (P<0.01), and the heat-sensitive moxibsution group was better than the psychological intervention group (P<0.05). In comparing the bowel symptom scale (BSS), the observation group was better than the other two groups (P<0.05), and there was a significant difference between the heat-sensitive moxibustion group and the psychological intervention group (P<0.05). In the comparison of QOL, the observation group was significantly superior to the other two groups (P<0.05), and there was a significant difference between the heat-sensitive moxibustion group and psychological intervention group (P<0.05). In comparing serum SP and 5-HT, the observation group was markedly better than the other two groups (P<0.05), and there were significant differences between the heat-sensitive moxibustion group and psychological intervention group (P<0.05). The self-rating anxiety scale (SAS) and self-rating depression scale (SDS) were used to estimate the mental state of the three groups, revealing that the observation group was better than the heat-sensitive moxibustion group and the psychological intervention group (P<0.05), and there were significant differences between the latter two groups (P<0.05).

Conclusion: Heat-sensitive moxibustion plus psychological intervention can regulate the levels of SP and 5-HT, improve BSS, SDS, SAS and QOL in treating IBS.

Keywords: Moxibustion Therapy; Moxa Stick Moxibustion; Heat-sensitive Moxibustion; Psychotherapy; Irritable Bowel Syndrome; Substance P; 5-Hydroxytryptamine; Quality of Life

【摘要】目的：观察热敏灸配合心理干预对肠易激综合征(IBS)患者血清 P 物质(SP)和 5-羟色胺(5-HT)含量及生活质量(QOL)的影响。**方法：**将 120 例 IBS 患者采用随机抽样法分为 3 组，每组 40 例，热敏灸组接受热敏灸治疗，心理干预组接受心理干预治疗，观察组同时接受热敏灸和心理干预治疗。治疗 3 个疗程后进行疗效观察。**结果：**治疗后，观察组疗效优于热敏灸组和心理干预组(P＜0.01)，热敏灸组疗效优于心理干预组(P＜0.05)。三组患者肠道症状尺度表(BSS)评分比较，观察组优于热敏灸组和心理干预组(P＜0.05)，热敏灸组与心理干预组差异有统计学意义(P＜0.05)。三组患者 QOL 比较，观察组明显优于热敏灸组和心理干预组(P＜0.05)；热敏灸组与心理干预组差异有统计学意义(P＜0.05)。三组患者血清 P 物质(SP)和 5-羟色胺(5-HT)比较，观察组明显优于热敏灸组和心理干预组(P＜0.05)，热敏灸组与心理干预组差异有统计学意义(P＜0.05)。三组患者焦虑自评量表(SAS)和抑郁自评量表(SDS)评分比较，观察组优于热敏灸组和心理干预组(P＜0.05)，热敏灸组与心理干预组差异有统计学意义(P＜0.05)。**结论：**热敏灸配合心理干预能调节 IBS 患者的 SP 和 5-HT 水平，改善 BSS，缓解 SDS 和 SAS，提高患者的 QOL。

【关键词】灸法；艾条灸；热敏灸；心理疗法；肠易激综合征；P 物质；5-羟色胺；生活质量

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Irritable bowel syndrome (IBS) is a common chronic gastrointestinal disorder and also a type of psychosomatic disease with typical pathological and physiological basis. It's mainly characterized by abdominal pain or discomfort, as well as changes in the pattern of bowel movements[1]. Based on clinical manifestations, IBS is classified into diarrhea-predominant IBS (IBS-D), constipation-predominant IBS (IBS-C), mixed IBS (IBS-M), and unsubtyped IBS (IBS-U). So far, it's found that IBS is associated with gastrointestinal dysmotility, visceral hypersensitivity, dysimmunity, gastrointestinal hormones (brain-gut peptides) disregulation, and mental factors[2]. The long duration and recurrent symptoms of IBS severely affect patient's life and work, and also cause great burden on social medical resource and national economy. In this study, we adopted heat-sensitive moxibustion plus psychological intervention to treat IBS, and the changes of substance P (SP) and 5-hydroxytryptamine (5-HT) in serum, and the quality of life (QOL) were also observed.

1 Clinical Materials

1.1 Diagnostic criteria

1.1.1 Diagnostic criteria of Western medicine

By referring to Rome Ⅲ criteria for IBS approved by the American College of Gastroenterology in 2006[3].

1.1.2 Diagnostic criteria of traditional Chinese medicine (TCM)

By referring to the *Consensus on Diagnosis and Treatment of IBS in TCM* stipulated by Spleen and Stomach Disease Branch of China Association of Chinese Medicine[4].

1.2 Inclusion criteria

Conforming to the diagnostic criteria for IBS of both Western medicine and TCM; aged from 25 to 52 years old; informed consent.

1.3 Exclusion criteria

With diseases severely affecting the cognition or communication; with hematochezia, anemia, or weight loss; abdominal pain or discomfort, and altered stool features and bowel habits caused by other diseases; with a history of gastrointestinal surgery; accompanied by respiratory or circulatory dysfunction; poor compliance, or unable to follow the treatment protocol; allergic to heat-sensitive moxibustion.

1.4 Statistical analyses

The SPSS 18.0 version software was used to process data. Measurement data with normal distribution and homogeneity of variance were expressed as mean ± standard deviation ($\bar{x} \pm s$), and the between-group comparisons were analyzed by *t*-test, while multi-group comparisons were analyzed by ANOVA. Rank-sum test was adopted for measurement data with heterogeneity of variance. Enumeration data were compared by Chi-square test. Comparisons of ranked data were processed by *Ridit* analysis. $P < 0.05$ indicated a statistically significant difference.

1.5 General data

A total of 120 eligible IBS patients were selected from the Rehabilitation Center of our hospital admitted between January 2012 and December 2015. By following a random sampling method, they were divided into a heat-sensitive moxibustion group, a psychological intervention group, and an observation group, 40 cases in each group. In the heat-sensitive moxibustion group, patients were aged 25-50 years old, with disease duration ranged 20-28 d; in the psychological intervention group, patients were aged 24-51 years old, with disease duration ranged 21-27 d; in the observation group, patients were aged 25-52 years old, with disease duration ranged 20-28 d. There were no significant differences in comparing the data of gender, age and disease duration among the three groups (all $P > 0.05$), indicating the comparability (Table 1).

Table 1. Comparison of the baseline data

Group	*n*	Gender (case)		Average age ($\bar{x} \pm s$, year)	Average duration ($\bar{x} \pm s$, day)
		Male	Female		
Heat-sensitive moxibustion	40	20	20	35.6±2.8	22.5±2.1
Psychological intervention	40	19	21	35.5±2.9	22.4±2.3
Observation	40	21	19	35.6±3.0	22.6±2.0

2 Treatment Methods

2.1 Heat-sensitive moxibustion group

Seeking heat-sensitive points: The doctor held an ignited moxa stick, applying mild moxibstion to Tianshu (ST 25), Zhongwan (CV 12), Xiawan (CV 10), Guanyuan (CV 4), Qihai (CV 6), Pishu (BL 20), Weishu (BL 21), Dachangshu (BL 25), Shenshu (BL 23), tender points, and the areas with subcutaneous nodules 1.5-2.0 cm away from skin with a radius of 3 cm. The heat-sensitive

points would be defined when there occurred penetration, transmission, or expansion of heat, or non-heat sensations.

Operation: Of all the discovered heat-sensitive points, 5-7 most sensitive points were selected to receive moxibustion treatment. In a comfortable position to expose the to-be-treated areas, the patients were treated with 4-step moxibustion, i.e. started with 2-minute twirling moxibustion, followed by 2-minute bird-pecking moxibustion to strengthen the heat-sensitization, 2-minute returning moxibustion along the meridian to activate meridian qi, and 5-minute mild moxibustion to warm and unblock meridians. During the operation, patients should feel slightly hot but without burning pain, and the doctor need to feel patient's skin temperature and adjust the treatment distance accordingly.

Moxibustion dosage: The moxibustion treatment to heat-sensitive points should be individualized, lasting from several minutes to 1 h, till the disappearance of the heat sensitization. The treatment was given once a day.

2.2 Psychological intervention group

First of all, the patients were educated about the causing factors, types and treatment progress of IBS to better understand this disease and build up a positive attitude towards it.

Second, due to the increased stress brought by the long duration and recurrent symptoms, most IBS patients present negative emotions, such as anxiety, depression and irritation, and even lose confidence in treatment. Therefore, doctors need to establish a harmonious relationship with patients by rigorous evaluation of patient's mental state, psychological counseling, asking the family members to try to satisfy the patient's requirement and to offer more care and love to them.

Besides, the patients were guided to live a healthy and regular life, e.g. guaranteeing sufficient sleep, proper diet and exercise habits, quitting smoke and alcohol, keeping a positive attitude towards life, and an easy mood facing the disease.

Last but not least, reading and music were used to release the negative emotions, such as stress and anxiety. If necessary, patients with the same problem could be arranged to stay together to share beneficial experiences, support and encourage each other, and bolster their confidence.

2.3 Observation group

The observation group received both the heat-sensitive moxibustion treatment and psychological intervention.

For the three groups, 7-day interventions were taken as a course of treatment, and the therapeutic efficacy was evaluated after 3 courses of treatment.

3 Treatment Efficacy

3.1 Evaluation items

3.1.1 Bowel symptom scale (BSS)[5]

BSS consists of 5 items: abdominal pain, days of abdominal pain, severity of abdominal pain, defecation and disturbances of daily living. The score of each component ranges from 0 to 100. Symptom scores can be graded as normal, mild, moderate and severe. Normal people: BSS score <75; mild: BSS score $\geqslant 75$ and <175; moderate: BSS score $\geqslant 175$ and <300; severe : BSS score $\geqslant 300$.

3.1.2 Evaluation of QOL[6]

The 36-item short-form health survey (SF-36) was used to evaluate QOL. It contains 8 domains and 36 items, i.e. 10 items for physical function (PF), 4 items for role-physical (RP), 2 items for bodily pain (BP), 6 items for general health (GH), 4 items for vitality (VT), 2 items for social functioning (SF), 3 items for role-emotional (RE), and 5 items for mental health (MH). The first 4 domains belong to physical health and the latter 4 belong to mental health. The full score is 145. The higher the score, the better the QOL. Questions in RP and RE are asked with 'yes' or 'no', while answers to questions in the rest domains are graded into 4-5 levels. Each question is weighed according to the impairment level that it represents, and the final score of each domain, ranging from 0 to 100, will be transferred into percentage in the end.

Final score = (Actual score − The lowest possible score) ÷ (The highest possible score − The lowest possible score) × 100%.

3.1.3 Detection of SP and 5-HT

Before the treatment and in the next morning of the final treatment, 3-5 mL venous blood on empty stomach was collected and sent to the Testing Center of Taihe Hospital for the detection of SP and 5-HT contents, with kits provided by Beijing Sino-UK Institute of Biological Technology.

3.1.4 Emotional state

The emotional state was estimated by self-rating anxiety scale (SAS) and self-rating depression scale (SDS)[7]. SAS score <50 points, normal; 50-60 points, mild; 61-70 points, moderate; >70 points, severe. SDS index score $<50\%$, normal (no depression); 50%-59%, mild depression; 60%-69%, moderate depression; $>70\%$, severe depression.

3.2 Criteria in evaluating clinical efficacy[8]

The clinical efficacy was judged based on the improvement rate of BSS score. Improvement rate = [(Pre-treatment score − Post-treatment score) ÷ Pre-treatment score] × 100%.

Recovered: Symptoms were substantially gone, and the improvement rate $\geqslant 75\%$.

Markedly effective: Symptoms were notably

improved, and the improvement rate ≥50%, <75%.

Effective: Symptoms were slightly ameliorated, and the improvement rate ≥30%, <50%.

Invalid: Symptoms were insignificantly changed, and the improvement rate <30%.

3.3 Results

3.3.1 Comparison of BSS score

There were no significant differences in comparing the BSS score among the three groups before intervention ($P > 0.05$). The score was somewhat improved in all three groups after treatment: the improvement was statistically significant in the heat-sensitive moxibustion group and the observation group ($P < 0.05$), but insignificant in the psychological intervention group ($P>0.05$). The observation group was significantly different from both heat-sensitive moxibustion group and the psychological intervention group ($P<0.05$), and the heat-sensitive moxibustion group was significantly different from the psychological intervention group ($P<0.05$), (Table 2).

3.3.2 Comparison of SF-36

There were no significant between-group differences in comparing the scores of RF, RP, BP, GH, VT, SF, RE and MH before intervention ($P>0.05$). After treatment, the three groups all showed significant improvements in the scores of RF, RP, BP, GH, VT, SF, RE and MH (all $P<0.05$). The observation group was significantly different from both the heat-sensitive moxibustion group and the psychological intervention group (all $P<0.05$), and the heat-sensitive moxibustion group was significantly different from the psychological intervention group (all $P<0.05$), (Table 3).

3.3.3 Comparison of SP and 5-HT contents

There were no significant between-group differences in comparing the contents of SP and 5-HT before intervention ($P > 0.05$). After treatment, the three groups all showed significant improvements in the contents ($P < 0.05$). The observation group was significantly different from both the heat-sensitive moxibustion group and the psychological intervention group ($P<0.05$), and the heat-sensitive moxibustion group was significantly different from the psychological intervention group ($P<0.05$), (Table 4).

Table 2. Comparison of BSS before and after the treatment ($\bar{x}$ ±*s*, point)

Group	*n*	Pre-treatment	Post-treatment
Heat-sensitive moxibustion	40	382±75	157±86[1)2)]
Psychological intervention	40	379±79	320±74[1)]
Observation	40	384±69	135±29[1)2)3)]

Note: Intra-group comparison, 1) $P<0.05$; compared with the psychological intervention group, 2) $P<0.05$; compared with the heat-sensitive moxibustion group, 3) $P<0.05$

Table 3. Evaluation of QOL of the three groups ($\bar{x}$ ±*s*, point)

Item	Heat-sensitive moxibustion group (*n*=40)		Psychological intervention group (*n*=40)		Observation group (*n*=40)	
	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment	Before-treatment	Post-treatment
PF	60.8±5.9	78.7±7.9[1)2)]	60.5±4.7	67.4±4.3[1)]	60.7±5.1	80.8±8.1[1)2)3)]
RP	48.6±7.6	59.4±5.8[1)2)]	48.7±7.1	56.3±4.6[1)]	48.5±7.1	65.6±7.5[1)2)3)]
BP	48.9±8.1	58.7±3.8[1)2)]	48.5±7.9	54.7±2.9[1)]	48.7±8.0	67.4±5.9[1)2)3)]
GH	47.8±5.9	56.1±2.8[1)2)]	47.5±5.7	51.7±3.5[1)]	47.3±6.1	65.6±4.8[1)2)3)]
VT	54.6±6.7	69.4±5.3[1)2)]	53.9±6.5	59.6±3.9[1)]	54.8±5.4	77.1±3.7[1)2)3)]
SF	51.7±3.7	68.7±4.3[1)2)]	51.1±3.5	57.7±4.2[1)]	51.3±2.5	76.4±5.1[1)2)3)]
RE	50.4±6.7	65.8±3.1[1)2)]	50.1±6.3	56.7±1.8[1)]	50.1±7.3	75.3±3.2[1)2)3)]
MH	57.1±7.1	70.6±2.8[1)2)]	57.4±6.8	60.7±8.1[1)]	56.8±8.2	78.7±5.4[1)2)3)]

Note: Intra-group comparison, 1) $P<0.05$; compared with the psychological intervention group, 2) $P<0.05$; compared with the heat-sensitive moxibustion group, 3) $P<0.05$

Table 4. Comparison of SP and 5-HT contents ($\bar{x}$ ±*s*)

Group	*n*	SP (pg/L)		5-HT (ng/mL)	
		Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
Heat-sensitive moxibustion	40	97.8±13.5	61.4±17.2[1)2)]	151.6±18.6	143.2±13.1[1)2)]
Psychological intervention	40	97.6±13.7	96.8±13.4[1)]	151.4±18.5	150.7±18.9[1)]
Observation	40	97.9±13.4	43.5±15.6[1)2)3)]	150.9±19.3	121.4±13.4[1)2)3)]

Note: Intra-group comparison, 1) $P<0.05$; compared with the psychological intervention group, 2) $P<0.05$; compared with the heat-sensitive moxibustion group, 3) $P<0.05$

3.3.4 Comparison of SAS and SDS scores

There were no significant between-group differences in comparing the SAS and SDS scores before intervention ($P > 0.05$). After treatment, the three groups all showed significant improvements in the scores ($P < 0.05$). The observation group was significantly different from both heat-sensitive moxibustion group and psychological intervention group ($P<0.05$), and the heat-sensitive moxibustion group was significantly different from the psychological intervention group ($P<0.05$), (Table 5).

3.3.5 Comparison of clinical efficacy

The total effective rate was 82.5% in the heat-sensitive moxibustion group, 72.5% in the psychological intervention group and 97.5% in the observation group. According to *Ridit* analysis, the observation group was significantly superior to the heat-sensitive moxibustion group and psychological intervention group ($P<0.01$), and the heat-sensitive moxibustion group was markedly better than the psychological intervention group ($P<0.05$), (Table 6).

Table 5. Comparison of SDS and SAS scores ($\bar{X}$ ±s, point)

Group	*n*	Time	SAS	SDS
Heat-sensitive moxibustion	40	Pre-treatment	54.7±4.2	58.3±4.1
		Post-treatment	45.4±3.4[1)]	51.5±3.14[1)]
Psychological intervention	40	Pre-treatment	54.6±4.5	58.1±4.7
		Post-treatment	32.7±3.5[1)3)]	41.1±2.81[1)3)]
Observation	40	Pre-treatment	54.5±3.5	58.7±5.3
		Post-treatment	22.3±2.4[1)2)3)]	31.5±2.6[1)2)3)]

Note: Intra-group comparison, 1) $P<0.051$; compared with the psychological intervention group, 2) $P<0.05$; compared with the heat-sensitive moxibustion group, 3) $P<0.05$

Table 6. Comparison of the clinical efficacy (case)

Group	*n*	Recovered	Markedly effective	Improved	Invalid	Total effective rate (%)
Heat-sensitive moxibustion	40	6	15	12	7	82.5[1)]
Psychological intervention	40	1	10	18	11	72.5
Observation	40	10	18	11	1	97.5[1)2)]

Note: Compared with the psychological intervention group, 1) $P<0.05$; compared with the heat-sensitive moxibustion group, 2) $P<0.05$

4 Discussion

IBS is a common gastrointestinal disorder, mainly presenting abdominal pain, abdominal distension, constipation, diarrhea, or constipation alternating with diarrhea. These recurrent symptoms often lead to unhealthy emotions such as anxiety, depression, irritation, or pessimism, negatively affecting patient's work and life[9]. So far, the causes and pathogenesis of IBS are not clear, but possibly related to intestinal motility disorder, abnormal intestinal sensitivity, infection, neuroendocrine factor, food, and psychosocial factors[10]. It's found that psychological factors may alter intestinal motility and visceral sensitivity, consequently aggravating gastrointestinal symptoms. It's also found that great stressful life event, psychiatric disorders and bad relationships may notably influence the manifestations of IBS[11]. With the progressive study of pathological and physiological mechanisms of IBS, the neuro-immuno-endocrine network has been revealed closely related to the development of IBS. SP and 5-HT are two typical factors respectively from the nervous and endocrine systems[12]. SP can stimulate small intestine and colon mucosae to produce water and electrolytes, causing plasma extravasation and neutrophil infiltration, thus influencing the severity of IBS[1]. The increase of SP in intestinal mucosa of IBS-C patients could be induced by prolonged bowel passage due to bowel spasm caused by visceral hypersensitivity[13]. 5-HT is a neurotransmitter which generally distributes in central nervous system and gastrointestinal tract, playing an important role in regulating digestive function, gland secretion and vasoconstriction. But excessive 5-HT may cause intestinal dysfunction[14]. Up till now, there is no cure or completely effective drug for IBS[15].

IBS belongs to the scope of abdominal pain or diarrhea in traditional Chinese medicine (TCM). In TCM, it's believed that the dysfunction of spleen and stomach should be the main cause. TCM has a long history fighting against abdominal pain and diarrhea. As a traditional therapy, moxibustion has been well explored in recent years. Heat-sensitive moxibustion is a special moxibustion method. Its key point is to select the heat-sensitized acupoints to provoke the transmission of meridian, promote the flow of meridian qi, and reach the focus, consequently regulating Zang-fu organs, meridians, qi and blood, and producing a higher clinical efficacy[16]. When receiving an optimal stimulation, the sensitized acupoint will produce a strong reaction. It is a vivid example showing that acupoints can reflect diseases, also crucial in selecting acupoints and enhancing the efficacy of acupuncture-moxibustion[17]. It's also found that heat-sensitive moxibustion can improve the food intake, body weight, visceral sensitivity and propulsion rate of small intestine in IBS

rats[18].

Via psychological theories and skills, psychological intervention is used to control unhealthy emotional factors and help patients maintain a good mental state. During attack, IBS patients often present negative emotions such as anxiety, depression and pessimism. It requires more care and support from family, society and medical staff to initiate the positive attitude of patients and normal psychological defense mechanism. Through counseling, it helps patients to conquer their fear and anxiety to the illness, build up confidence in the treatment, and promote the recovery[19].

This study showed that heat-sensitive moxibustion effectively improved BSS score and QOL, and regulated the production of SP and 5-HT in IBS patients; psychological intervention improved SAS and SDS scores. When used together with heat-sensitive moxibustion, psychological intervention can better help the depression and anxiety state, and more effectively improve the MH domain in QOL. This combination treats both somatic disease and mental state, helping patients to actively participate in the treatment, improving the compliance and clinical efficacy.

Conflict of Interest

The authors declared that there was no potential conflict of interest in this article.

Statement of Informed Consent

Informed consent was obtained from all individual participants included in this study.

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