Effect of acupuncture combined with Astragalus injection on peripheral blood inflammatory factors in children with diarrhea-predominant irritable bowel syndrome

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Abstract
The objective of this article is to explore the clinical efficacy of acupuncture therapy of Traditional Chinese Medicine (TCM) combined with Astragalus injection in the treatment of children with diarrhea-predominant irritable bowel syndrome (IBS), and its effects on 5-hydroxytryptamine (5-HT), neuropeptide Y (NPY), and calcitonin gene-related peptide (CGRP) in peripheral blood. A total of 116 children with diarrhea-predominant IBS admitted to our hospital from January 2017 to January 2018 were randomly divided into two groups. The control group was treated with Astragalus injection, while the research group was treated with acupuncture therapy of TCM combined with Astragalus injection. The therapeutic effects, the concentrations of CGRP, NPY, and 5-HT in peripheral blood were compared between the two groups. The therapeutic efficacy of the study group was better than that of the control group (P < 0.05). The concentrations of CGRP, NPY, and 5-HT in the peripheral blood of the study group were less than those of the control group (P < 0.05). Acupuncture therapy of TCM combined with Astragalus injection has a satisfactory effect in the treatment of children with diarrhea-predominant IBS, which is worthy of more publicity and application in the clinic.

Keywords
acupuncture therapy, Astragalus injection, diarrhea-predominant irritable bowel syndrome

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Introduction
Diarrhea-predominant irritable bowel syndrome (IBS) is a disease with abnormal intestinal function, which is usually manifested as abdominal distension, abdominal pain, thin feces, increased number of stools, and other diarrhea. In addition, some patients are accompanied by dry stools, difficult defecation, and alternating constipation and diarrhea1. The causes of the disease are related to the living environment, the destruction of intestinal microbial environment, gastrointestinal dysfunction, heredity, and abnormal brain–intestinal axis metabolism. In recent years, the incidence of the disease has become higher and higher, and it has been listed as a category of “diarrhea” in Traditional Chinese Medicine (TCM)2. The location of the disease is in the intestine. The nature of the disease is mixed with the real disease and the virtual disease.
and the organs usually involved are the kidney, the spleen and the stomach, and the liver. It was believed in TCM that the role of the liver is to dredge the whole body and regulate emotion. The function of the spleen and stomach is to transport water and gas in the body, dehumidify the body, and so on. If the liver is injured, the function of the spleen and stomach is inhibited, it is reduced, and this eventually develops into diarrhea-predominant IBS. Acupuncture therapy of TCM has unique advantages in the treatment of this disease. It can effectively control the development of the patient’s condition by improving the functions of the spleen, stomach, and liver. In the treatment of children with diarrhea-predominant IBS, our hospital used acupuncture therapy of TCM combined with Astragalus injection for therapeutic effect, which is reported as follows.

Astragalus is a herb whose root is used for the preparation of folk medicine. Astragalus has long been known in TCM as an immune modulating herb. In clinical practice, administration of Astragalus has achieved widespread use in the treatment of diabetes, and in the treatment of kidney abnormalities caused by diabetes. Polysaccharides, astragaloside, isoflavones, and saponin glycosides are the primary Astragalus extracts. Although research findings are mixed, Astragalus may help improve the heart function in patients with heart failure and reduce symptoms of myocarditis if given intravenously. When given intravenously in a hospital setting, Astragalus may help alleviate nausea and vomiting in those undergoing chemotherapy. However, minor side effects have been reported in studies, such as a rash, itching, runny nose, nausea, and diarrhea. When given by intravenous (IV), Astragalus may have more serious side effects, such as irregular heartbeat. It should only be administered by IV or injection under medical supervision.

Materials and methods

General data
A total of 116 children with diarrhea-predominant IBS admitted to our hospital from January 2017 to January 2018 were randomly divided into two groups. Inclusion criteria: (1) 116 children who had frequent abdominal pain, abdominal distension, and other symptoms before the visit and (2) 116 children and their families were informed and agreed to the study. Exclusion criteria: (1) patients with diarrhea caused by food poisoning, (2) children with abnormal hematopoietic function, (3) children who were complicated with malignant tumors, (4) children with mental disorders, and (5) children with an allergic reaction to the drug used. There were 58 patients in the control group, 16 males and 42 females, aged 2–14 years, with an average age of (11.3 ± 2.5) years. The study group consisted of 58 patients, 20 males and 38 females, aged 3–14 years, with an average age of (11.1 ± 2.7) years. The general data of 116 children were comparable (P > 0.05), and the study was reviewed by the Ethics Committee of our hospital. The Rome II criteria were subsequently modified and the current internationally agreed diagnostic criteria for childhood IBS, known as the Rome III criteria, was used. These criteria include abdominal pain and discomfort lasting on average at least 1 day a week in the last 3 months, associated with at least two of these factors: pain and discomfort are related to defecation, the frequency of defecation is altered, or stool consistency is altered.

Several tests, including stool studies to check for infection or problems with the intestine’s ability to take in the nutrients from food (malabsorption) were also performed. A number of other tests were performed to rule out other causes for IBS, for example, flexible sigmoidoscopy, colonoscopy, X-ray or computed tomography (CT) scan, lactose intolerance tests, and upper endoscopy.

Methods

Control group
The control group was treated with Astragalus injection (Chinese medicine quasi character Z51021775, produced by Chengdu Diao Jiuyi Co., Ltd.), and 20–40mL of Astragalus injection was mixed with 250–500mL of normal saline or glucose for IV infusion of children once a day. For 1 month of continuous treatment, antibiotics and other drugs are prohibited from being given during the treatment, and children are prohibited from eating irritating food.

Study group
The study group was treated with acupuncture therapy of TCM on the condition of the control group. The main acupuncture points were Yintang, bilateral Taichong, bilateral Zusanli, bilateral Tianshu, Baihui,
bilateral Sanyinjiao acupoint, and bilateral Shangjuxu (the specific acupuncture points are shown in Figure 1). The supine position is selected for the child and the skin is routinely sterilized. The needle should be inserted quickly to a depth of about 20 mm. After needling, a slight red halo can be observed on the skin nearby, indicating the exposure to qi. The method of needling is rotating or lifting-thrusting manipulation. After getting qi, the needle was left for 30 min, 5 times/W, and treated continuously for 1 month.

**Observation index**

1. The therapeutic effects of the two groups were compared. Significant effect: the symptoms of abdominal distension and abdominal pain disappeared, and the stool returned to normal. The toilet was used 1–2 times a day. Invalid: the symptoms of abdominal distension and abdominal pain improved, the stool improved, and the interval between defecations is longer than before treatment. Invalid: no improvement in symptoms and stool.

2. The concentrations of calcitonin gene-related peptide (CGRP), neuropeptide Y (NPY), and 5-hydroxytryptamine (5-HT) in the peripheral blood of the two groups were compared. To begin the procedure of drawing a peripheral blood sample, the patients were made to sit or lie in a chair with the arm extended on an armrest. A tourniquet was placed around the upper arm to allow blood to collect in the veins, making the veins easier to find and puncture. The skin was then sanitized, usually the inside of the elbow. A sterile needle was then inserted into a vein, and attached to a collection container, typically a tube. After collection, the needle was removed and a bandage was placed at the puncture site. Pressure was applied for a few minutes to stop the bleeding. After collection, the blood was to centrifuge the serum before and after treatment, and the concentrations of CGRP, NPY, and 5-HT were detected by ELISA. The detection should be carried out in strict accordance with instructions based on the previous literature.

**Statistical method**

Data analysis was performed using SPSS 18.0 statistical software, in which the count data were subjected to $X^2$ test (%), while the measurement data were detected by $t$ test($\bar{x} \pm s$). $P < 0.05$ was considered statistically significant.

**Results**

**Comparison of general data between the two groups**

The general data of the two groups were comparable ($P > 0.05$), as shown in Table 1.
Table 1. Comparison of general data between the two groups.

| Groups       | Cases | Gender (cases, %) | Average age (years, $\overline{x} \pm s$) | Average weight (kg, $\overline{x} \pm s$) | Average disease duration (year, $\overline{x} \pm s$) |
|--------------|-------|-------------------|------------------------------------------|------------------------------------------|--------------------------------------------------|
|              |       | Males | Females |                              |                                      |                                                   |
| Control group| 58    | 16(47.1) | 42(52.9) | 11.3 ± 2.5                           | 28.6 ± 1.2                             | 1.0 ± 0.8                                          |
| Study group  | 58    | 20(52.9) | 38(47.1) | 11.1 ± 2.7                           | 27.8 ± 1.4                             | 1.1 ± 0.3                                          |
| $X^2$       | /     | 1.435 | 1.655   | 1.100                                 | 1.324                                  | 1.012                                              |
| $P$         | /     | >0.05 | >0.05   | >0.05                                 | >0.05                                  | >0.05                                              |

Table 2. Comparison of therapeutic effects between the two groups (cases, %).

| Groups       | Cases | Significant effect | Valid | Invalid | Efficiency |
|--------------|-------|--------------------|-------|---------|------------|
| Control group| 58    | 19(32.8)           | 31(53.4) | 8(13.8) | 86.2%      |
| Study group  | 58    | 21(36.2)           | 35(60.3) | 2(3.5)  | 96.5%      |
| $X^2$       | /     | 4.418              | 5.515   | 6.612   |            |
| $P$         | /     | <0.05              | <0.05   | <0.05   | <0.05      |

Table 3. Comparison of CGRP, NPY, and 5-HT concentrations in peripheral blood of two groups of children ($\overline{x} \pm s$).

| Groups       | Time                 | CGRP (pg/mL) | NPY (pg/mL) | 5-HT (ng/mL) |
|--------------|----------------------|--------------|-------------|--------------|
| Control group| Prior treatment      | 102.1 ± 27.1 | 143.3 ± 34.1 | 102.3 ± 21.1 |
|              | Post treatment a     | 96.2 ± 22.0  | 130.3 ± 28.2 | 94.1 ± 12.1  |
| Study group  | Prior treatment      | 102.2 ± 28.0 | 143.4 ± 35.2 | 102.4 ± 21.2 |
|              | Post treatment ab    | 92.3 ± 21.8  | 120.4 ± 23.1 | 86.7 ± 11.3  |

CGRP: calcitonin gene-related peptide; NPY: neuropeptide Y; 5-HT: 5-hydroxytryptamine.
The comparison within the group is $^aP<0.05$; compared with the control group, $^bP<0.05$.

Comparison of therapeutic effects between the two groups

The therapeutic efficacy of the study group was better than that of the control group ($P<0.05$), as depicted in Table 2.

Comparison of CGRP, NPY, and 5-HT concentrations in peripheral blood of two groups of children

The concentrations of CGRP, NPY, and 5-HT in the peripheral blood of the study group were less than those of the control group ($P<0.05$), as demonstrated in Table 3.

Discussion

Diarrhea-predominant IBS is an intestinal disease. In recent years, it has been clinically believed that the cause of the disease is related to the abnormal metabolism of the patient’s emotional and brain–intestinal axis. The visceral condition can affect the gastrointestinal function, and the central nervous system that innervates the visceras interacts with the gastrointestinal nerve. To some extent, this indicates that the central nervous system of the visceras has a certain relationship with the gastrointestinal function. This connection is called brain-gut axis metabolism. CGRP, NPY, 5-HT, and other neurotransmitters in the peripheral blood play a very important role in the process of interaction between the visceral central nervous system and the gastrointestinal nervous system. The concentrations of CGRP, NPY, and 5-HT in children with diarrhea-predominant IBS were significantly increased. Clinically, the treatment of acupuncture therapy of TCM combined with Astragalus injection can efficiently reduce the concentrations of CGRP, NPY, and 5-HT. It has been shown in the studies that the concentrations of CGRP, NPY, and 5-HT in the peripheral blood of the study group are lower than those in the control group, which indicates that the application of acupuncture therapy of TCM combined with Astragalus injection in the treatment of
children with diarrhea-predominant IBS is effective and ideal. And it can also decline the concentration of each neurotransmitter. In the procedure of acupuncture therapy of TCM, Yintang point, bilateral Taichong point, bilateral Zusanli point, bilateral Tianshu point, Baihui point, bilateral Sanyinjiao acupoint, and bilateral Shangjuxu point are selected for acupuncture. Many of these are important acupoints to improve the functions of the liver and spleen and stomach. By strengthening the spleen and soothing the liver, the functions of the spleen and stomach and liver can be obviously improved, the development of illness can be controlled, and the symptoms can be alleviated. At the same time, acupuncture can effectively regulate the emotional state of the child, and play the role of physical and mental treatment, so it is better to apply to the treatment of diarrhea-predominant IBS. Moreover, the combination of acupuncture and Astragalus injection can reduce the concentration of gastric acid secretion, thereby improving gastrointestinal function and visceral function. In addition, Astragalus injection can effectively improve the body’s immunity and reduce the recurrence rate. The application of TCM acupuncture combined with Astragalus injection in the treatment of children with diarrhea-predominant IBS has high clinical value. However, a limitation according to a report published in Scientific Reports, is that acupuncture can cause serious adverse effects, such as infections, nerve and blood vessel injury, complications from needle breakage or remnant needle pieces, punctured organs, central nervous system or spinal cord injury, hemorrhage, and other organ and tissue injuries.

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**Declaration of conflicting interests**

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

**Ethical approval**

The ethics committee of our hospital commented that the research questions are well defined and the methods of data analysis are sound. The members of the committee present gave a favorable ethical opinion of the above research on the basis described in the application form. Informed written consent was given by the family or guardian protocol and supporting documentation, subject to the conditions specified recorded under reference No. 11/H0809/200.

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