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Special Topic Study

Clinical observation of treatment of infantile diarrhea due to spleen deficiency using five-step pediatric tuina of Huxiang school

湖湘流派五步法小儿推拿治疗脾虚型小儿泄泻临床观察

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Abstract
Objective: To observe the clinical efficacy of treating infantile diarrhea due to spleen deficiency with five-step pediatric tuina of Huxiang school.
Methods: Using a randomized controlled trial design, sixty eligible kids with diarrhea due to spleen deficiency were randomized into an observation group and a control group, with 30 cases in each group. The observation group was intervened by the five-step pediatric tuina method of Huxiang school, and the control group received conventional tuina treatment. The intervention was conducted once a day, consecutive 5-day treatment as 1 course, at a 2-day interval between courses, successively for a total of 4 courses. Changes in the primary and secondary symptoms of diarrhea due to spleen deficiency were observed, and the clinical efficacy was evaluated.
Results: After treatment, the scores of primary and secondary symptoms and the general score of diarrhea due to spleen deficiency were improved; the improvements in fecal form and frequency, decreased appetite, bloating after meals and fatigue and sluggishness were more significant in the observation group than in the control group.
Conclusion: The five-step pediatric tuina method of Huxiang school and conventional tuina both can improve the primary and secondary symptoms in infantile diarrhea due to spleen deficiency, while the former one can produce more significant efficacy.
Keywords: Tuina; Massage; Pediatric Tuina; Diarrhea; Spleen Deficiency Syndrome; Child, Preschool

【摘要】目的：探讨湖湘流派五步法小儿推拿治疗脾虚型小儿泄泻的临床疗效。**方法：**采用随机、对照临床试验设计，将符合纳入标准的60例脾虚型泄泻患儿随机分为观察组和对照组，每组30例，观察组采用湖湘流派五步法小儿推拿治疗，对照组采用传统推拿治疗。每天治疗1次，连续治疗5 d为1疗程，疗程间休息2 d，连续治疗4个疗程。观察脾虚泄泻的主要、次要症状评分变化，并进行疗效评价。**结果：**治疗后，两组脾虚泄泻的主要、次要症状评分和总分均有改善，观察组在改善脾虚证大便性状和次数、食欲减退、食后饱胀及神疲肢倦症状方面效果优于对照组。**结论：**湖湘流派五步法小儿推拿与传统推拿均能改善脾虚型小儿泄泻患儿的主要和次要症状，湖湘流派五步法小儿推拿疗效优于传统推拿。

【关键词】推拿；按摩；小儿推拿；泄泻；脾虚证；儿童，学龄前
【中图分类号】R244.1　　**【文献标志码】**A

Infants aged between 6 months and 2 years old are more likely to develop diarrhea, a digestive disease resulting from various pathogens and factors. It is clinically manifested as increased defecation frequency, and loose, watery or egg-soup-like stools[1]. This disease can occur in any season, but is more often seen in summer and autumn. It is one of the major causes of malnutrition, developmental disability and death in infants[2]. Infantile diarrhea belongs to the scope of Xie Xie (diarrhea) in traditional Chinese medicine (TCM)[3], and spleen deficiency is a common pattern. Western medicine usually treats it with antibiotics, but antibiotics may have tolerance and harm kids' health. In TCM, there is a variety of methods to treat infantile diarrhea, including Chinese medication, tuina, cupping, acupuncture, acupoint injection, moxibustion and acupoint application. Among which, pediatric tuina is more welcome in kids and their parents because it is easy to operate and free of adverse effects.

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This study observed the clinical efficacy of the five-step pediatric tuina method of Huxiang school, which takes Wujing syndrome differentiation as the core, in treatment of infantile diarrhea due to spleen deficiency. Conventional tuina was taken as the control to find an optimal tuina treatment protocol for infantile diarrhea due to spleen deficiency. The report is given as follows.

1 Clinical Materials

1.1 Diagnostic criteria

1.1.1 Diagnostic criteria in Western medicine

Adopting the diagnostic criteria of infantile diarrhea in *Zhu Fu-tang Textbook of Pediatrics*[4]: increased defecation frequency, over 3 times a day, accompanied by altered fecal volume or form (large volume and mostly loose); routine stool examination may detect undigested food or a small amount of fat droplets; symptoms last for over 2 weeks.

1.1.2 Diagnostic criteria in TCM

Referring to the *Pediatrics of Traditional Chinese Medicine*[5]: loose stools in light color and odorless, often after meals, and the severity may vary; a sallow complexion, emaciation, low spirit and lassitude; a pale tongue covered by white coating, a slow and weak pulse, and light fingerprints.

The diagnostic criteria of diarrhea due to spleen deficiency in the *Criteria of Diagnosis and Therapeutic Effects of Diseases and Syndromes in Traditional Chinese Medicine*[6] were referred. Primary symptoms: persistent diarrhea, often after meals, may vary in severity, with loose or watery stools, and milky residuals or other undigested food can be seen. Secondary symptoms: drowsy, poor appetite, a pale complexion, a pale tongue body with thin greasy coating, and a weak pulse.

1.2 Inclusion criteria

Conformed to the diagnostic criteria in both Western medicine and TCM, and also in line with the criteria of syndrome differentiation in TCM; agreed to receive tuina treatment, with no lesion in the to-be-treated areas; age ≥3 months and ≤3 years, gender unlimited; the guardian or the patient agreed to participate in the trial, and the guardian signed the informed consent form.

1.3 Exclusion criteria

Took medication within 3 d prior to the intervention; vomiting or severe dehydration; coupled with other diseases; infectious diarrhea caused by enteritis, dysentery or cholera.

1.4 Statistical analysis

The SPSS version 20.0 was used for statistical analysis. Measurement data that met normal distribution and homogeneity of variance were expressed as mean ± standard deviation ($\bar{x} \pm s$), with paired *t*-test used for intra-group comparisons and group *t*-test for between-group comparisons. When the measurement data failed to meet normal distribution or homogeneity of variance, non-parametric test would be applied. Enumeration data were analyzed by Chi-square test. Ranked data were processed by rank-sum test. $P<0.05$ was indicative of statistical significance.

1.5 Participants

The participants were recruited via the official website and WeChat subscription of the First Hospital of Hunan University of Chinese Medicine, and by posters at the Pediatric Tuina Outpatient of the hospital and the neighborhoods.

1.6 Study design and the basic information

According to the principle of randomization, sixty eligible infants with diarrhea due to spleen deficiency were divided into an observation group and a control group by the random number table, with 30 cases in each group. To avoid bias, tuina treatment was performed by one same practitioner. There were no significant differences in the data of gender, age and disease duration (all $P>0.05$), indicating the comparability (Table 1).

Table 1. Comparison of the general data

Group	*n*	Gender (case)		Average age ($\bar{x} \pm s$, year)	Average duration ($\bar{x} \pm s$, week)
		Male	Female		
Observation	30	16	14	2.4±0.1	2.6±1.5
Control	30	13	17	1.9±0.8	2.2±1.0

2 Treatment Methods

The two groups of patients received same basic intervention: oral rehydration salts (ORS) or intravenous rehydration for dehydration; serum electrolyte test and blood gas analysis when necessary, for preventing or correcting acid-base imbalance and electrolyte disorder.

During the trial, diarrheal drugs and antibiotics were prohibited. Light and easy-to-digest food was required. Other interventions were provided accordingly.

2.1 Observation group

2.1.1 Step 1: Kai-opening orifices

Kai-opening Tianmen: Two thumbs alternately Tui-pushed from Yintang (GV 29) upward to Shenting (GV 24), (Figure 1).

Tui-pushing Kangong: Two thumbs Tui-pushed from the middle between the eyebrows respectively towards the end of the eyebrow (Figure 2).

Rou-kneading Taiyang (EX-HN 5): Thumbs or middle fingers Rou-kneaded Taiyang (EX-HN 5, located 1 cun posterior to the middle between the lateral canthus and the tip of the eyebrow), (Figure 3).

An-pressing Zongjin: The tip of the thumb placed at the middle of the wrist crease, gradually pressing down with a 2-second pause each time before pressing further (Figure 4).

Fen-parting yin-yang: The radial side of the two thumbs Tui-pushed separately from the middle of the wrist crease (Figure 5).

The above manipulations were repeated for 24 times, working to awaken the brain and open the orifices.

2.1.2 Step 2: selecting acupoints based on syndrome differentiation (Wujing syndrome differentiation)

Bu-reinforcing Pijing: The practitioner held the kid's thumb with his left thumb and index finger and Tui-pushed the kid's thumb belly with his right thumb belly circularly (Figure 6).

Qing-clearing Ganjing: The practitioner straight Tui-pushed the kid's index finger from the tip to the root with the radial side of his thumb (Figure 7).

Qing-clearing Xinjing: The practitioner straight Tui-pushed the kid's middle finger rom the tip to the root with the radial side of his thumb (Figure 8).

Bu-reinforcing Feijing: The practitioner clockwise Tui-pushed the kid's ring finger belly with the radial side of his thumb (Figure 9).

Bu-reinforcing Shenjing: The practitioner clockwise Tui-pushed the kid's little finger belly with the radial side of his thumb (Figure 10).

The above manipulations were repeated for 200-500 times each depending on the kid's age: the younger the kid, the less the operation, and vice versa.

2.1.3 Step 3: selecting acupoints based on symptoms

Rou-kneading Banmen: The practitioner Rou-kneaded the kid's thenar with his thumb belly (Figure 11).

Qia-finger-nail pressing Sihengwen: The practitioner heavily Qia-finger-nail pressed the first interphalangeal crease of the kid's index finger, middle finger, ring finger and little finger in order with the nail of his thumb (Figure 12).

Mo-rubbing abdomen: The practitioner clockwise Mo-rubbed the kid's abdomen around the belly button (Figure 13).

The above manipulations were repeated for 100-300 times depending the kid's age: the younger the kid, the less the operation, and vice versa.

2.1.4 Step 4: adjunct acupoints

Nie-pinching the spine: The practitioner lightly Nie-pinched the skin along the kid's spine with his thumb, index and middle fingers from the bottom to the neck when the kid's back was fully exposed for 5-10 times till the kid's back turned red and hot (Figure 14).

Anrou-pressing and kneading Zusanli (ST 36): The practitioner Anrou-pressed and kneaded the kid's Zusanli (ST 36) with his thumb belly for 200-300 times[7] (Figure 15).

2.1.5 Step 5: Guan-closing orifices

Na-grasping Jianjing (GB 21): The practitioner Ti-lifted and Nie-pinched the kid's Jianjing (GB 21) with his thumb, index and middle fingers for 5 times (Figure 16).

2.2 Control group

The control group received conventional tuina treatment. The locations and manipulations all referred to *Tuina Science*[8].

Bu-reinforcing Pijing 300 times: The manipulation was same as that for the observation group (Figure 6).

Bu-reinforcing Dachang 300 times: The practitioner held the kid's hand with his left hand and Tui-pushed the kid's index finger from the tip to the root with the radial side of his right thumb (Figure 17).

Tui-pushing Shangsanguan 100 times: The practitioner Tui-pushed the radial side of the kid's wrist towards the elbow with the radial side of his thumb or the belly of his index and middle fingers (Figure 18).

Mo-rubbing abdomen 200 times: The manipulation was same as that for the observation group (Figure 13).

Tui-pushing Shangqijiegu 30 times: The practitioner Tui-pushed from the kid's tail bone towards the lower back with the radial side of his thumb or the belly of his index and middle fingers (Figure 19).

Nie-pinching the spine 5 times: The manipulation was performed same as that for the observation group (Figure 14).

The two groups of kids all received intervention once a day, 5 times a week as one course, at a 2-day interval between courses, for a total of 4 courses.

Figure 1. Kai-opening Tianmen

Figure 2. Tui-pushing Kangong

Figure 3. Rou-kneading Taiyang (EX-HN 5)

Figure 4. An-pressing Zongjin

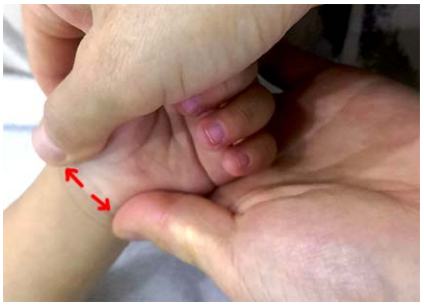

Figure 5. Fen-parting yin-yang

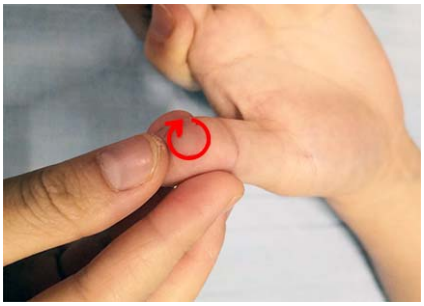

Figure 6. Bu-reinforcing Pijing

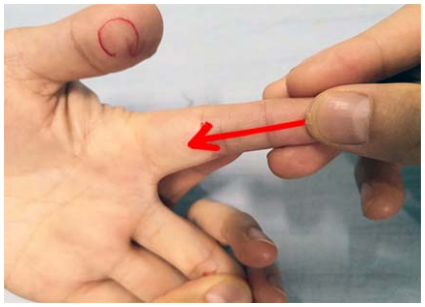

Figure 7. Qing-clearing Ganjing

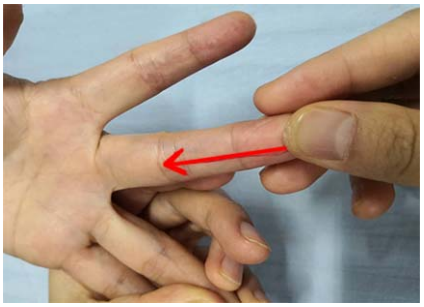

Figure 8. Qing-clearing Xinjing

Figure 9. Bu-reinforcing Feijing

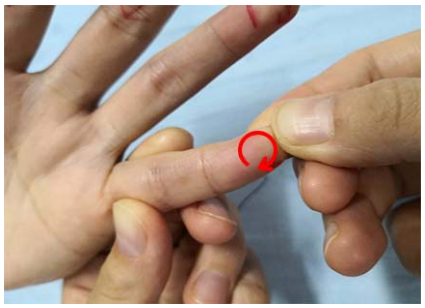

Figure 10. Bu-reinforcing Shenjing

Figure 11. Rou-kneading Banmen

Figure 12. Qia-finger-nail pressing Sihengwen

Figure 13. Mo-rubbing abdomen

Figure 14. Nie-pinching the spine

Figure 15. Anrou-pressing and kneading Zusanli (ST 36)

Figure 16. Na-grapsing Jianjing (GB 21)

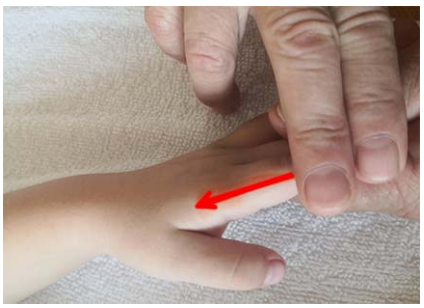

Figure 17. Bu-reinforcing Dachang

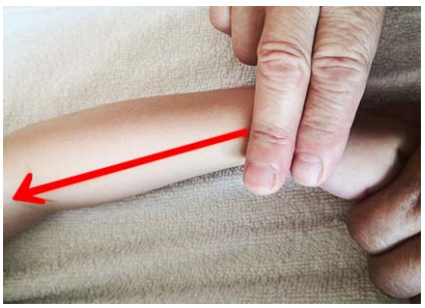

Figure 18. Tui-pushing Shangsanguan

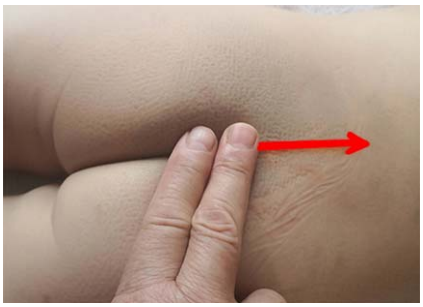

Figure 19. Tui-pushing Shangqijiegu

3 Observation of Therapeutic Efficacy

3.1 Observation items

The improvements in the primary and secondary symptoms of diarrhea due to spleen deficiency were taken as the major efficacy evaluation criteria. These symptoms were graded as mild, moderate and severe, and scored respectively[9]. The higher the score, the severer the disease condition. The details are shown in Table 2 and Table 3.

3.2 Criteria of therapeutic efficacy

The therapeutic criteria in the *Criteria of Diagnosis and Therapeutic Effects of Diseases and Syndromes in Traditional Chinese Medicine* were adopted.

Cured: The defecation frequency and stool form were completely normal; the manifestations of spleen deficiency were basically gone; the general score of the primary and secondary symptoms reduced by ≥90%.

Markedly effective: The defecation frequency obviously went down and the stool form showed improvement; the manifestations of spleen deficiency showed significant improvement; the general score of the primary and secondary symptoms reduced by ≥70%, but <90%.

Effective: The defecation frequency went down and the stool form was improved; the manifestations of spleen deficiency showed certain improvement; the general score of the primary and secondary symptoms reduced by ≥30%, but <70%.

Invalid: The defecation frequency and stool form were not improved; the manifestations of spleen deficiency were not improved; the general score of the primary and secondary symptoms reduced by <30%.

Table 2. The scoring standard for the primary symptoms

Primary symptoms	Mild (1 point)	Moderate (3 points)	Severe (5 points)
Stool form	Soft blobs, shapeless	Fluffy or mushy stools	Watery stool
Frequency	2-3 times/day	4-5 times/day	>5 times/day

Table 3. The scoring standard for the secondary symptoms

Secondary symptoms	Mild (1 point)	Moderate (2 points)	Severe (3 points)
Decreased appetite	Loss of appetite but able to maintain normal intake	Loss of appetite and the intake decreased by 1/3	The intake decreased by over 2/3 or not eating anything
Spiritless and fatigue	Slightly lassitude and sluggish	Lassitude and sluggish	Extremely fatigue and weak
Bloating after meal	Slightly bloating, released or gone in half an hour	Bloating and uncomfortable, getting worse in half an hour or 1 h	Severe bloating, not getting better in 2 h

3.3 Results

3.3.1 Comparison of the therapeutic efficacy

After treatment, rank-sum test showed a significant difference in the therapeutic efficacy between the two groups (P<0.05). The total effective rate was 100.0%, and the recovery and markedly-effective rate was 50.0% in the observation group, versus 93.3% and 26.6% in the control group, and the between-group differences

were statistically significant (P<0.05), indicating that the observation group produced more significant efficacy than the control group. The details are shown in Table 4.

3.3.2 Comparison of the primary and secondary symptom scores of diarrhea due to spleen deficiency

Before treatment, there were no significant differences in the primary and secondary symptom scores of diarrhea due to spleen deficiency between the two groups (all P>0.05), indicating the comparability. After treatment, the scores all showed improvements in the two groups with statistical significance (all P<0.05), suggesting that the two tuina methods both can improve the symptoms of diarrhea due to spleen deficiency. There were significant differences in the scores of stool form, defecation frequency, decreased appetite, bloating after meal and spiritless and fatigue between the two groups after treatment (all P<0.05), indicating that the five-step infantile tuina of Huxiang school should be superior to the conventional tuina method in improving symptoms such as bloating and fullness. The details are shown in Table 5.

Table 4. The comparison of the therapeutic efficacy (case)

Group	n	Cured	Markedly effective	Effective	Invalid	Recovery and markedly-effective rate (%)	Total effective rate (%)
Observation	30	4	11	15	0	50.0[1)]	100.0[1)]
Control	30	0	8	20	2	26.6	93.3

Note: Compared with the control group, 1) P<0.05

Table 5. Comparison of the primary and secondary symptom scores of diarrhea due to spleen deficiency ($\bar{x}$ ±s, point)

Symptom	Observation (n=30)		Control group (n=30)	
	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
Stool form	2.29±0.82	1.19±0.36[1)2)]	2.19±0.36	1.92±0.05[1)]
Defecation frequency	2.37±1.04	1.08±0.44[1)3)]	2.08±0.44	2.05±0.42[1)]
Decreased appetite	1.41±0.28	0.95±0.27[1)2)]	1.95±0.27	1.16±0.31[1)]
Bloating after meal	1.96±0.49	0.78±0.31[1)2)]	1.98±0.31	1.12±0.81[1)]
Spiritless and fatigue	1.93±0.47	1.22±0.21[1)2)]	2.22±0.21	1.55±0.11[1)]

Note: Intra-group comparison, 1) P<0.05; compared with the control group after treatment, 2) P<0.05, 3) P<0.01

4 Discussion

TCM holds that spleen is the postnatal foundation. The spleen-stomach function is usually weak in kids and susceptible to be affected by exogenous pathogenic factors. When spleen and stomach function is damaged, they will fail to digest food, distribute the nutrients, and differentiate the clear from the turbid, so that diarrhea develops[10]. The ultimate cause of diarrhea due to spleen deficiency in kids is the inadequate spleen qi. The poor digestive function will cause water and dampness retention in gastrointestinal system and then lead to diarrhea. Therefore, the treatment should target both the superficial manifestations and the root causes[11].

The Wujing compatibility in Huxiang school emphasizes the five-element pairing, generation and restriction interactions among meridians, acupoints and Zang-fu organs, and recommends to take the Wujing acupoints as the core, through which to finally regulate the organic function of human body[12]. Wujing compatibility theory has integrated the concepts of five elements, visceral manifestations and meridian-organ relationships. Since Wujing corresponds to the five Zang organs, and the five Zang organs correspond to the five elements, so the five-element compatibility exists in the five Zang and six Fu organs, twelve ordinary meridians and the five acupoints[13].

The five-step infantile tuina of Huxiang school consists of Kai-opening orifices, acupoint selection based on syndrome differentiation (Wujing syndrome differentiation), symptom-based acupoint selection, adjunct acupoint selection, and Guan-closing orifices. Kai-opening orifices and Guan-closing orifices are to better regulate and harmonize qi and blood, and unblock and activate meridian qi. Wujing syndrome differentiation is the feature and also the core of the infantile tuina of Huxiang school. It discovers which organ to blame according to the characteristics of infantile Zang organs and treats it by reinforcing the deficient and reducing the excess as the basic principle. Selecting acupoints that correspond to the primary and secondary symptoms is to select acupoints according to the symptoms of the disease for cure. This study comprehensively used the five approaches for Kai-opening orifices, Bu-reinforcing Pijing, Bu-reinforcing

Feijing, Bu-reinforcing Shenjing, Qing-clearing Xinjing, and Qing-clearing Ganjing, to simultaneously regulate all the five Zang organs, modulate the deficiency and the excess, in combination with Nie-pinching the spine. It is also found that patients with spleen deficiency also suffer from intestinal flora disorder[14]. Li XT, *et al*[15] adopted syndrome-differentiation-based tuina to treat infantile diarrhea and achived significant efficacy with 1-week intervention. Su GF, *et al*[16] combined Rou-kneading Banmen, Bu-reinforcing Pijing, Qing-clearing Dachang, Yun-circular pushing Neibagua, Fen-parting yin-yang, Anrou-pressing and kneading Zhongwan (CV 12) and Zusanli (ST 36), and Mo-rubbing abdomen (clockwise), Rou-kneading Tianshu (ST 25), Rou-kneading Guiwei, and Nie-pinching the spine to treat infantile diarrhea. The treatment was given once a day and the kid's defecation became normal after 2 consecutive treatments. Research showed that Nie-pinching the spine can stimulate the cortex via the stimulation to the spinal nerves, so as to adjust the Zang-fu organs and the digestive function, inhibiting the hyperactive peristalsis and ceasing diarrhea[17].

LI TL, *et al*[18] found that Nie-pinching the spine down-regulated the content of serum gastrin and thus improved the gastrointestinal function of spleen deficiency rats. Li TL, *et al*[19] also found that Nie-pinching the spine up-regulated the content of serum D-xylose, improved the symptoms of spleen qi deficiency and increased the body weight of spleen qi deficiency rats. These results all suggest that Nie-pinching the spine can enhance the spleen-stomach function, boost appetite, increase the transforming function of spleen and strengthen the intestine's digestion and absorption of nutrients. They are also the evidence proving the efficacy of this manipulation in treatment of spleen qi-deficiency[20-21]. Kids usually have tender Zang-fu organs. Manipulations at the relevant body parts can easily regulate the function of Zang-fu organs, dilate capillaries, improve blood circulation, and enhance the immune system[22]. Based on the theory that kid's spleen qi is usually inadequate and sufficient spleen qi can keep the body away from pathogenic evils in TCM, and the Wujing syndrome differentiation developed by Liu Kai-yun (based in the Western region of Hunan Province), the five-step infantile tuina of Huxiang school has become a specific infantile tuina method. This tuina treatment has been well-accepted and applied in clinic, and its therapeutic efficacy has been verified.

Conflict of Interest

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

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Statement of Informed Consent

Informed consent was obtained from the guardians of the recruited children in this study.

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