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Application of Acupuncture and Tuina Therapy Combined with Functional Training to Patients with Parkinson's Disease

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Keywords

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Abstract

Objective To analyze the effect of acupuncture and Tuina therapy combined with functional training on patients with Parkinson's disease. **Methods** A total of 78 patients with Parkinson's disease who were treated in our hospital between April 2018 to April 2020 were selected and randomly divided into observation group (n=39) and control group (n=39), according to the random number table method. The patients in the control group were treated with functional training, while those in the observation group were further treated with acupuncture and Tuina therapy on the basis of functional training. The clinical efficacy, Berg Balance Scale (BBS) scores, phase-shifted values of substantia nigra compact zone and the incidence of adverse reactions were compared between the two groups. **Results** The total effectiveness rate of the observation group was significantly higher than that of the control group (P<0.05). After treatment, the BBS scores of the two groups were noticeably higher than those before treatment (P<0.05), with the BBS scores of the observation group greatly higher than those of the control group (P<0.05). Moreover, after treatment, the phase radiants of substantia nigra compact zone in the two groups was sharply higher than that before treatment (P<0.05), with that in observation group significantly higher than that in control group (P<0.05). The incidence of adverse reactions in the observation group was noticeably lower than that in the control group (P<0.05). **Conclusion** Acupuncture and Tuina therapy combined with functional training showed strong effects on the treatment of patients with Parkinson's disease, as it could significantly improve the balance ability of patients, the phase-shifted value of substantia nigra compact zone, and is highly safe for the patients.

Introduction

Parkinson's is a common neurological disease among the elderly. The disease often manifests as increased muscle tone, slow movement, postural balance disorder, resting tremor, and cognitive dysfunction. As the disease progresses, the patient's clinical symptoms gradually deteriorate, seriously affecting their life quality [1-3]. In clinical treatment, functional training, which is a therapy adjuvant to Parkinson's conventional drugs and surgical treatment, can improve motor function and reduce the side effects caused by drugs or surgery [4,5]. In recent years, the external treatment of traditional Chinese medicine has gradually become an important strategy for the management of many diseases. Acupuncture and Tuina therapy, for example, are commonly used as external treatment of traditional Chinese medicine in the intervention of various diseases, such as functional rehabilitation and pain control, with a positive therapeutic significance [6,7]. At present, functional training, acupuncture and Tuina therapy are often used alone rather than in combination in related disease treatment. Few studies report the effect of the combination of the two. Therefore, this study applies acupuncture and Tuina therapy combined with functional training as an adjuvant therapy to treatment of Parkinson's patients, with an aim to develop more effective and safe strategy so as to improve the clinical symptoms of Parkinson's patients.

Materials and methods

General information

The study subjects

We selected 78 Parkinson's patients who were treated in our hospital from April 2018 to April 2020 as the study subjects. They were divided into observation group and control group by random number table method, with 39 cases in each group. In observation group, there were 21 males and 18 females, with an average age of (68.59±12.13) years old and an average course of disease of (4.15±0.77) years. For disease classification, specifically, 10 cases were of grade I, 16 cases were of grade II, and 13 cases were of grade III. In control group, there were 22 males and 17 females, with an average age of (51.02±10.37) years old and an average disease course of (4.08±0.69) years. For disease classification, 12 cases were of grade I, 15 cases were of grade II, and 12 cases were of grade III. This study was approved by the Medical Ethics Committee of our hospital. All the patients voluntarily participated in the study and signed informed consent. There was no statistically significant difference between the two groups in terms of gender, age, course of disease, or disease classification (P>0.05).

Inclusion and exclusion criteria

Patients who were clinically diagnosed with Parkinson's [8] and were conscious were included. Parkinson's syndrome caused by various other factors, or patients combined with dysfunctions in heart, liver, kidney in other important organs or with coagulation system dysfunction and mental disorders or showing a poor compliance with this study were excluded.

Methods

The control group

The control group adopts functional training, including sports and cognitive trainings as follows: ① Motor functional training: patients were instructed to perform motor functional training, including face, neck, trunk, limbs, etc., in accordance with a gradual, passive to active movement, Tuina therapy and relax the their muscles first, and then move from far to near, from small joints to large joints. For patients with mild symptoms, they were instructed to performed active motor function training, such as Tai Chi, walking, etc.. For patients with combined dysfunction or sitting difficulty, their caregivers were asked to assist them in massaging patients' limbs and moving their joints, with gentle and slow movements to promote blood circulation and avoid pain. For patients with excessive tremor, arrange the patient to sit on a chair and hold the arm of the chair to reduce tremor, in addition, caregivers were trained to pay attention to whether the patient's posture in motor function training was correct to prevent deformities. At the same time, when assisting patients in training,

mandatory actions should be avoided to prevent accidents. ②Cognitive function training mainly included orientation, attention, and memory training. In daily life, patients have to report daily general information such as the time and location of the day. Before going to bed, the most memorable thing of the day was recorded, and patients were asked to recall the cause and effect of the event. Moreover, hobbies such as reading, writing, watching TV, etc. were developed, and patients were encouraged to retell the story. Numerical training was also conducted.

Observation group

On the basis of functional training, the patients were further treated with adjuvant therapy of acupuncture and Tuina therapy. (1) Acupuncture and moxibustion therapy: ①The "Tremor Three Needles " was the main acupoints consisting of Sishen acupuncture, Siguan acupoint, Fengchi acupoint, of which Sishen acupoint is located in 1.5 inches away from the front, back, left, and right sides of Baihui (the midpoint of the connection between the two ear tips); the Siguan acupoint are bilateral Hegu points (at the back of the hand, between the first and second metacarpal bones, and the midpoint of the second metacarpal bone) and the Taichong point (the back of the foot, the concavum pedis in the front of the first 2 metatarsal junctions); Fengchi point is located under the nape-occiput, the depression between the upper outer edge of the trapezius muscle and the upper rear edge of the sternocleidomastoid muscle. ②Based on the principle of "traditional syndrome differentiation", if the patient had liver and kidney deficiency, Shenshu, Ganshu, and Sanyinjiao acupoints were further adopted, if the patient had phlegm-heat, Zhongwan, Fenglong, and Yinlingquan were additionally adopted, if the patients were combined with insufficient Qi and blood, Xuehai, Qihai, and Zusanli acupoints were further adopted. ③Operation method: the patients were in supine position, the local skin of the patients were routinely disinfected, a 1.5-inch filiform needle was applied using reinforcing-reducing twirling method, the needle was held for 60 minutes (min). The patient's tolerance was carefully monitored when performing the acupuncture. The acupuncture was performed once every other day, for a total of 2 courses (15 day was a course of treatment). (2) Tuina therapy: ① Based on the principle of " traditional syndrome differentiation ", meridians and collaterals were selected and traditional Chinese medicine methods of replenishing and reducing the meridian was adopted to, perform Tuina therapy according to the anatomical characteristics. ② Tuina on head and limb massage. During head Tuina, the patient takes the supine position, a physician divides the eyebrow arch, pushes the Yintang, and rubs the temples, and softens the tremor area and massages acupoints such as Baihui, Fengchi, and Touwei for 2 to 3 min at each point. During upper limb massage, the physician kneads the upper limb flexor muscles for 4 to 5 times as well as the acupoints of Sanli, Jianjing, Yangchi, Hegu, Quchi, etc. for 2 to 3 min, followed by flexion, extension, abduction of upper extremity, exercise of wrists and elbow joints by slowly pulling each joint for 2 to 3 min in each direction. During lower limb massage, the front side of the thigh and the outer side of the calf were rubbed for 4 to 5 times. Acupuncture points such as Lingquan were kneaded for 2 to 3 min at each point, once a day, for 30 times as a course of treatment for a total of 2 courses of treatment.

Observation indicators

Balance capacity

The Berg Balance Scale (BBS) was used to evaluate the patient's static and dynamic balance ability [10]. The total score of BBS ranging from 0 to 56 points, specifically, 0 to 20 points indicate that the patient's balance function is poor with a need a wheelchair; 21-40 points indicates that the patient has a certain balance ability but needs to walk with assistance; 41-56 indicates that the patient a relatively high balance ability and can walk independently. Total score of lower than 40 points indicates that the patient is at risk of falling, with a lower score indicating a worse balance ability.

Phase-shifted value of the substantia nigra compact zone

A superconducting whole-body MR scanner is used to detect the phase-shifted value of the substantia nigra compact zone of the patients. 3 days before the examination, the patient stopped using related drugs for the treatment of Parkinson's and avoided strenuous exercise. The 8-channel head coil is used as the transmitting and receiving coil. After scanning, the original image was processed into SWI image and phase image on the workstation, and the substantia nigra compact zone were identified. On the corresponding phase diagram, the phase-shifted value of the substantia nigra compact zone before and after treatment was measured, and ensured that the area of interest remained unchanged during each measurement.

Adverse reactions

The occurrence of dizziness, nausea, diarrhea and other adverse reactions between the two groups of patients was compared: the incidence of adverse reactions = the number of adverse reactions/total number of cases × 100%.

Statistical methods

SPSS 20.0 was employed for statistical analysis, counting data were compared by $\chi 2$ test, while measurement data was expressed as mean ± standard deviation ($\bar{x}\pm s$). The comparison was performed by t test, and $P<0.05$ was considered as statistically significant.

Results

Comparison of clinical effectiveness between the two groups

The total effectiveness rate of the observation group was 94.87%, and that of the control group was 76.92%. The total effective rate of the observation group was significantly higher than that of the control group ($P<0.05$), see Table 1.

Table 1 Comparison of clinical effectiveness between the two groups of patients

Groups	N	Markedly effective	Effective	Ineffective	Total effectiveness [n(%)]
Observation group	39	22	15	2	37 (94.87)
Control group	39	18	12	9	30 (76.92)
χ^2					5.186
P					0.023

Comparison of BBS scores between the two groups

Before treatment, the BBS scores of the two groups were not significantly different ($P>0.05$), but after treatment, the BBS scores of the two groups were significantly higher than before treatment ($P<0.05$), noticeably, the BBS scores of the observation group were noticeably higher Control group ($P<0.05$), see Table 2.

Table 2 Comparison of BBS scores between the two groups ($\bar{x}\pm s$)

Group	N	Before treatment	After treatment	*t*	*p*
Observation group	39	35.36±6.61	45.15±8.06[ab]	-5.865	0.000
Control group	39	35.78±7.03	40.32±7.75[a]	-2.710	0.008
t		-0.272	2.698		

p	0.786	0.009

Comparison of the phase-shifted value of the substantia nigra compact zone between the two groups

Before treatment, there was no significant difference in the phase-shifted value of the substantia nigra compact zone between the two groups (P>0.05). After treatment, the phase-shifted value of the substantia nigra compact zone between the two groups was significantly higher than before treatment (P<0.05). Additionally, the phase-shifted value of the substantia nigra compact zone of the observation group was greatly higher than that of the control group (P<0.05), see Table 3.

Table 3 Comparison of the phase-shifted value of the substantia nigra compact zone between the two groups（$\bar{x}$±s）

Groups	N	Before treatment	After treatment	*t*	*p*
Observation group	39	-0.0742±0.001	-0.0719±0.001	-10.157	0.000
Control group	39	-0.0745±0.002	-0.0733±0.001	-3.351	0.000
t		0.838	6.182		
p		0.405	0.000		

Comparison of the incidence of adverse reactions between the two groups of patients

The incidence of adverse reactions in the observation group was 7.69% and that in the control group was 25.64%, with the incidence rate in the observation group significantly lower than that in the control group (P<0.05), see Table 4.

Table 4 Comparison of the incidence of adverse reactions between the two groups of patients

Groups	n	Headache	Nausea	Diarrhea	Total incidence rate [n(%)]
Observation group	39	2	1	0	3（7.69）
Control group	39	4	3	3	10（25.64）
χ^2					4.523
P					0.033

Discussion

Parkinson's is a chronic disease of the elderly. The incidence of Parkinson's is gradually increasing with the acceleration of the aging of the Chinese population [11,12]. Neuropathological changes of Parkinson's are resulted from selective degeneration and deletion of dopaminergic neurons in the substantia nigra, often accompanied by massive deposition of neuronal α-synuclein, gliosis and mitochondrial dysfunction [13,14]. In Chinese medicine [15,16], Parkinson's belongs to the categories of "tremor" and "endogenous wind". The main pathogenesis of this disease is deficiency of liver and kidney and of both Qi and blood, syndrome of stirring wind due to phlegma-heat. For such a disease, clinically, Traditional Chinese medicine is mostly based on replenishing liver and

kidney, replenishing Qi and blood, and dredging the meridians. In recent years, adjuvant treatments have gradually attracted the attention of clinicians. According to foreign reports [17], effective exercise can improve the Parkinson's patient's motor function and reduce mental symptoms. In traditional Chinese medicine, it is believed that acupuncture combined with Western medicine is an effective treatment of Parkinson's patients, and it is found that it could better promote the circulation of Qi and blood, relaxing meridians and collaterals, and can significantly improve the clinical outcome of treatment [18]. Moreover, Tuina therapy can adjust the body's Qi and blood and visceral function, thus attenuating the clinical symptoms of Parkinson's patients [19].

This study further explored the effects of acupuncture and Tuina therapy combined with functional training on Parkinson's patients, and found that its clinical efficacy is significantly better than applying functional training alone. Scholars such as Xie Q [20] applied acupuncture and moxibustion combined with speech rehabilitation training in the clinical treatment of patients with dysphonia after stroke. They also found that the combined program shows strong clinical effects, which can promote the recovery of patients and increase the recovery rate. Among the adjuvant therapies of traditional Chinese medicine, "Tremor Three Needles" acupuncture, which is widely targeted acupuncture point for the treatment of Parkinson's, consists of Sishenzhen, Siguan and Fengchi. Sishenzhen is related to a wide range of brain veins and meridians; Fengchi acupoint is the meeting of hand-foot shaoyang and Yangwei, which can produce the effect of “Xifeng Zhichan” and relieve tremor; Siguan acupoint have the function of reconciling camp and health, balancing Yin and Yang, nourishing liver and kidney, promoting blood circulation and removing blood stasis. Acupuncture on the above points supplemented by syndrome differentiation produce a strong effect on the clinical treatment of Parkinson's patients. In addition, this study also applied Tuina therapy on the meridian of Parkinson's patients for promoting the circulation of Qi and blood and relaxing meridians dredging the collaterals, thus regulating the function of the viscera, thereby improving the blood circulation of the body, reducing muscle tension, and further promoting patients’ recovery of body function. Chinese medicine as an adjuvant therapy combined with functional training could minimize secondary damage and improve patients’ physical function.

A large number of studies have shown [21,22] that Parkinson's patients are often accompanied by balance dysfunction such as abnormal posture and gait, and are prone to fall and have a higher disability rate. After acupuncture and Tuina therapy combined with functional training, the BBS score of Parkinson's patients was significantly increased, indicating that combined treatment with functional training can effectively improve the balance dysfunction of Parkinson's patients, which is similar to the results of the study by Yeo S et al. [23]. This may be because acupuncture and Tuina therapy can adjust the antioxidant enzyme system of Parkinson's patients. In related animal experiments [24,25], acupuncture therapy enhances the activity of tyrosine hydroxylase in the substantia nigra of Parkinson's rats, inhibits the expression of nitric oxide enzyme in the cerebral cortex, and reduces the content of glutamate in the striatum, promotes the production of glial cell line-derived neurotrophic factors, thereby reducing brain damage and improving balance function.

In pathological changes, the oxidation reaction and free radicals can easily damage the substantia nigra of the brain, leading to pathological iron deposition in the dense zone of the substantia nigra, triggering the apoptosis of substantia nigra cells, and reducing dopaminergic neurotransmitters in the striatum. This is one of the main causes of Parkinson's disease. Studies have shown that [26] that Parkinson's patients show more iron deposition in the substantia nigra compact zone than healthy controls. The decrease in the phase-shifted value of the substantia nigra compact zone indicates an increase in iron content in the body. When the pathological iron deposition is aggravated, it will cause serious adverse effects on brain tissues. This study found that acupuncture and Tuina combined with functional training can increase

the phase-shifted value of the substantia nigra compact zone and improve the patient's motor function. Acupuncture and Tuina therapy can effectively repair diseased tissues, reduce nerve damage factors, and increase the expression of monoamine transmitters in the brain. At the same time, the therapy can also promote the function of dopaminergic neurons in the substantia nigra compact zone and plasticity after neuronal degeneration, which increases the content of dopamine, thereby promoting the recovery of brain function and reducing clinical symptoms. In addition, this study also found that the therapy can effectively relieve headaches, nausea, diarrhea and other adverse reactions, suggesting that acupuncture and Tuina therapy combined with functional training is high safe to patients.

In summary, acupuncture and Tuina combined with functional training have a strong clinical effect on the treatment of Parkinson's patients. It can significantly improve the patient's balance ability, increase the phase-shifted value of the substantia nigra compact zone, and is highly safe.

Acknowledgement

Not applicable.

Conflict of Interest

The authors declare no conflicts of interest.

Author Contributions

Conceptualization, Data curation and Writing-Original draft, C.F.H; Writing-review and editing, X.Y.C; All authors have read and agreed to the published version of the manuscript.

Ethics Approval and Consent to Participate

The study was approved by the Medical Ethics Committee, and the patients were informed and consented.

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Availability of Data and Materials

The data presented in this study are available on request from the corresponding author.

Supplementary Material

Not applicable.

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