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Comprehensive Rehabilitation Therapy of Traditional Chinese Medicine Combined with Modern Rehabilitation Training Improves the Spasticity and Motor Function of Hemiplegia after Stroke

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Abstract: *Objective:* To analyze the impact of comprehensive rehabilitation therapy of traditional Chinese medicine (TCM) (based on modern rehabilitation training) on the spasticity and motor function in stroke patients with hemiplegia. *Methods:* Seventy-nine stroke and hemiplegia patients admitted to the hospital from June 2021 to June 2023 were selected and randomly divided into a control group (39 cases) using modern rehabilitation training, and an observation group combined with comprehensive TCM rehabilitation therapy (40 cases), over 1 month. The clinical index data of the two groups were compared. *Results:* There were differences in the clinical index data between the two groups. The total effective rate after treatment in the observation group (92.50%) was higher than that of the control group (74.36%) ($\chi^2 = 4.727$, $P < 0.05$). All central sensitization inventory (CSI) and stroke quality of life (PRO) scores in both groups were lower after treatment, with the observation group having lower scores as compared to the control group ($P < 0.05$). The scores of FMA (upper limbs, lower limbs), Barthel index scores, and Functional Ambulation Categories (FAC) scores of both groups increased after treatment, with the observation group having higher scores as compared to the control group ($P < 0.05$). *Conclusion:* Comprehensive TCM rehabilitation therapy had a significant therapeutic effect on patients with hemiplegia after stroke. It improved the patient's spasticity, limb movement, and walking function. Their daily living abilities and quality of life were also enhanced.

Keywords: Stroke; Walking function; Hemiplegia; Comprehensive rehabilitation therapy of traditional chinese medicine; Spasticity; Modern rehabilitation therapy

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1. Introduction

Stroke is presented with a high incidence, mortality, and disability rates. If not promptly treated, it may lead to serious complications such as cerebral-cardiac syndrome (CCS) and cerebral edema, thereby endangering

the patient's life. Among them, hemiplegia is one of the common sequelae of stroke, which often manifests as sensory, motor, and other functional impairments that significantly affect the daily lives of patients [1]. Currently, modern rehabilitation training is a conventional clinical treatment plan for stroke hemiplegia. Although it can promote the recovery of the patient's limb functions and improve their quality of life, its application has a long treatment cycle, slow results, and poor clinical treatment results. Cerebral stroke is classified as "stroke" in the theory of TCM. After the onset of stroke, it can lead to venous stasis, qi deficiency, blood stasis, etc.. This can lead to various sequelae, such as hemiplegia, crooked mouth, and crooked tongue. The treatment principles of TCM include regulating qi and blood, relaxing muscles, dredging meridians, activating blood circulation, and removing blood stasis. Comprehensive rehabilitation therapy of TCM mainly includes acupuncture, oral administration TCM, massage, and other therapies. It can benefit qi, activate blood circulation, resolve phlegm, dredge collaterals, relieve spasm symptoms, improve limb movement functions, and thus promote recovery. This study selected 79 stroke and hemiplegia patients admitted to the hospital from June 2021 to June 2023 to explore the application value of comprehensive rehabilitation therapy of TCM in hemiplegic patients after stroke.

2. Materials and methods

2.1. General information

79 stroke and hemiplegic patients admitted to this hospital were selected. Inclusion criteria: (1) Patients who meet the diagnostic criteria of Western and traditional Chinese medicine (combined with symptoms such as limb weakness and numbness) [2,3]; (2) patients who were diagnosed with stroke and hemiplegia and confirmed by imaging examination; (3) patients with the first onset of disease; (4) compliant and consented. Exclusion criteria: (1) Patients with other severe physical disorders; (2) patients with bleeding tendencies; (3) patients with other brain diseases; (4) presence of malignant tumors, transient ischemic attacks, etc.

The control group consisted of 39 subjects, 25 males and 14 females. In 21 cases, the hemiplegia was located on the left side, and in 18 cases on the right side. The subjects were aged 45–76 years old, with an average age of 62.78 ± 6.12 years. The duration of the disease ranged from 1–6 months, with an average interval of 2.52 ± 0.47 months. There were 24 cases of ischemic stroke and 15 cases of hemorrhagic stroke.

The observation group consisted of 40 subjects, 27 males and 13 females. In 25 cases, the hemiplegia was located on the left side, and in 15 cases on the right side. The subjects were aged 44–78 years old, with an average age of 62.82 ± 6.69 years. The duration of the disease ranged from 1–5 months, with an average interval of 2.34 ± 0.62 months. There were 26 and 14 cases of ischemic stroke and hemorrhagic stroke, respectively. This study was carried out after being approved by the Medical Ethics Committee of our hospital.

2.2. Method

The drug treatment and care the patients received during hospitalization were all carried out by the same team of medical staff. Both groups received conventional Western medicine treatment: blood pressure control, symptomatic treatment, dehydration treatment, anticoagulation treatment, etc.

The control group received modern rehabilitation training. Auxiliary equipment was used to regularly perform restoration of limb muscle strength, joint activity, walking, and other training, according to the patient's ability. The patients underwent training for 15–20 min each time, twice a day. The patients were subjected to close observation, where their mental state was assessed. Furthermore, nurse-patient communication was strengthened targeted psychological counseling and intervention for patients with negative emotions were carried out. Patients were also encouraged to carry out upper limb functional activity training, vocational

rehabilitation training, and daily living ability training, for 15–20 min each time, once a day. The HB-SJ1 neuromuscular electrical stimulation therapy device was used for physical therapy. The wave width and output intensity were set to 700 ms and 0–15 mA, respectively. The frequency was fixed at a two-way square wave mode. This was carried out for 1 month.

Based on the control group, the observation group received comprehensive rehabilitation therapy of TCM. The patients were subjected to massage treatment. The patient was instructed to adopt a supine position and the doctor's technique should be gentle. The heel of the palm was used to massage the elbow joint, shoulder joint, forearm, lateral muscle group (inside the upper arm), and wrist joint on the affected side. This method involved alternating the palm softness method and rolling method 2 to 3 times, where each acupoint (Waiguan, Yangchi, Zhenhui, Tianjing, Shousanli, Jianqiu, Jizhen, Sidu, and Quchi) was rubbed at the same time. The amplitude gradually increased and passive activities of the elbow, shoulder, and wrist joints were performed for 30 times / min, once a day, for 6 times/week. The patients received acupuncture treatment, where the patient lay supine, and the elbow joint of the upper limb on the affected side was straightened out. The acupuncture points were disinfected. A sterile acupuncture needle (0.35 mm × 25.00 mm) was inserted quickly into the acupuncture points. Based on Deqi (arrival of qi), lifting, insertion (depth 1–3 cm), and twisting (180°) techniques were deployed 60 times /min, and the needle was retained for 30 minutes once a day, for 6 times/week. By using antagonistic muscle acupuncture, the meridians were chosen as the acupoints (Yangxi, Zhenhui, Shousanli, Jianqiu, Jizhen, Tianjing, and Waiguan), where the inferior muscle groups for spasms in the upper limbs were located. Patients were given the Huatan Tongluo decoction (200 mL) orally twice a day. All medicines were added and decocted to 400 mL. It was composed of *Pinellia ternata* (9 g), *Cyperus rotundus* (9 g), 12 g of *Atractylodes macrocephala* (12 g), *Gastrodia elata* (12 g), Arisaema Cum Bile (6 g), wine rhubarb (5 g), and red sage (15 g). The amount of the ingredients was adjusted according to the patient's syndrome. In terms of spams of muscles and body stiffness, red peony root, white peony root, *Leymus chinensis*, and *Millet Spatholobus* were added. In cases of phlegm and heat, bamboo root and skullcap were added. For prolonged hemiplegia, insect drugs (scorpions, silkworms, etc.) were incorporated. Astralagus was added for qi deficiency. Mulberry and *Achyranthes bidentata*s were added for liver and kidney deficiency. Each treatment was carried out for 1 month.

2.3. Observation indicators and evaluation standards

The clinical efficacy of the patient after treatment was evaluated [4]. It was divided into "effective" (National Institutes of Health Stroke Scale (NIHSS) score was reduced by 18%–44%, symptoms improved), "markedly effective" (NIHSS score was reduced by ≥ 45%, symptoms significantly improved), and "ineffective" (NIHSS score was reduced by < 18%, symptoms did not improve).

The patient's spasticity before and after treatment was assessed based on the central sensitization inventory (CSI) score. The assessment contents included muscle tone (0–8 points), tendon reflexes (0–4 points), and clonus (0–4 points). The higher the score, the greater the spasticity.

The Fugel-Meyer (FMA) score and the Holden Functional Walking Classification (FAC) score were used to evaluate the patient's motor and walking function before and after treatment. The FMA score assessment included two aspects: upper limb motor function (0–66 points) and lower limb motor function (0–34 points). The motor function of the upper and lower limbs is positively correlated with the scores. The total FAC score ranged from 0–5 and the score was positively correlated with the ability to walk independently.

Before and after treatment, the patient's self-care ability and quality of life were evaluated based on Barthel index score and stroke quality of life (PRO) score. The Barthel index score ranged from 0–100 and the score was positively correlated with self-care ability. The total score of the PRO score ranged from 0–64. The

assessment included 4 aspects: symptoms (subjective, objective) and function (psychological, social). The score was negatively correlated with the quality of life.

2.4. Statistical methods

Statistical analysis was carried out using the SPSS 25.0 software. Measurement data was expressed as mean ± standard deviation and compared using a *t*-test. Count data were expressed as % and analyzed using the chi-squared (χ^2) test. Results were considered statistically significant at $P < 0.05$.

3. Results

3.1. Comparison of clinical efficacy between the two groups

As shown in Table 1, the total efficacy of the observation group was higher than that of the control group after treatment ($P < 0.05$).

Table 1. Comparison of clinical efficacy between the two groups [*n* (%)]

Group	Cases, *n*	Markedly effective	Effective	Ineffective	Total efficacy
Control group	39	13 (33.33)	16 (41.03)	10 (25.64)	29 (74.36)
Observation group	40	17 (42.50)	20 (50.00)	3 (7.50)	37 (92.50)
χ^2					4.727
P					0.030

3.2. Comparison of CSI score

As shown in **Table 2**, the tendon reflexes, muscle tone, and clonus scores of both groups were reduced after treatment, with the observation group having lower scores as compared to that of the control group ($P < 0.05$).

Table 2. Comparison of CSI scores between the two groups before and after treatment (mean ± standard deviation, points)

Group	Tendon reflex		Muscle tension		Clonus	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Control group (n = 39)	2.58 ± 0.41	1.85 ± 0.25*	5.75 ± 0.50	4.55 ± 0.36*	2.87 ± 0.36	2.42 ± 0.48*
Observation group (n = 40)	2.56 ± 0.37	1.52 ± 0.24*	5.72 ± 0.48	3.24 ± 0.45*	2.84 ± 0.35	2.09 ± 0.29*
t	0.228	5.986	0.272	14.265	0.376	3.709
P	0.820	< 0.001	0.786	< 0.001	0.708	< 0.001

Note: Compared with each group before treatment, $^*P < 0.05$.

3.3. Comparison of FMA and FAC scores

As shown in **Table 3**, the FMA (upper and lower limbs) and FAC scores in both groups increased after treatment, with the observation group having higher scores as compared to that of the control group ($P < 0.05$).

Table 3. Comparison of FMA and FAC scores between the two groups before and after treatment (mean ± standard deviation, points)

Group	FMA upper limb score		FMA lower limb score		FAC score	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Control group (n = 39)	28.11 ± 4.86	41.42 ± 3.24*	9.52 ± 1.56	15.34 ± 3.66*	1.23 ± 0.25	3.43 ± 0.34*
Observation group (n = 40)	28.52 ± 4.45	50.95 ± 3.78*	9.18 ± 1.47	20.81 ± 3.03*	1.26 ± 0.28	4.16 ± 0.35*
t	0.391	12.018	0.997	7.244	0.502	9.400
P	0.697	< 0.001	0.322	< 0.001	0.617	< 0.001

Note: Compared with each group before treatment, *P < 0.05.

3.4. Comparison of Barthel Index Score and PRO Score

As shown in **Table 4**, the Barthel index scores in both groups increased after treatment, with the observation group having a higher increase than that of the control group (P < 0.05). The PRO scores in both groups decreased after treatment, with the observation group having lower scores than that of the control group (P < 0.05).

Table 4. Comparison of Barthel index scores and PRO scores between the two groups before and after treatment (mean ± standard deviation, points)

Group	Barthel index score		PRO rating	
	Before treatment	After treatment	Before treatment	After treatment
Control group (n = 39)	36.72 ± 4.76	48.47 ± 4.23*	35.55 ± 4.36	26.34 ± 3.62*
Observation group (n = 40)	36.95 ± 4.48	56.95 ± 5.72*	35.42 ± 4.23	23.87 ± 3.08*
t	0.221	7.477	0.135	3.269
P	0.826	< 0.001	0.893	< 0.001

Note: Compared with each group before treatment, *P < 0.05.

4. Discussion

Stroke hemiplegia is a disease caused by central nervous system damage due to stroke, which in turn leads to paralysis of one side of the limb. It can cause limb motor dysfunction, seriously affecting the patient's quality of life, hence, prompt treatment is crucial [5]. Modern rehabilitation training (based on conventional Western medicine) is the main treatment option for hemiplegia after a stroke. Although the patient's prognosis can be improved by anti-platelet aggregation, improving limb function, etc., a longer treatment cycle can easily reduce patient compliance and reduce the treatment efficacy [6].

TCM believes that the limp paralysis stage in the recovery process of stroke hemiplegia is classified as "paralysis," which is mainly caused by the closure of the orifices, qi deficiency, blood stasis, and venous stasis. Therefore, the clinical treatment should be based on replenishing qi, clearing phlegm, promoting blood circulation, removing blood stasis, and dredging the meridians [7,8]. Comprehensive rehabilitation therapy of TCM, based on the syndrome differentiation and treatment of diseases, combines a variety of treatment methods (TCM decoction, acupuncture, massage). These combined methods have certain advantages in controlling the disease and improving patient prognosis. Among them, acupuncture is commonly applied. According to the patient's condition, the treatment is carried out through acupuncture points on the shoulders,

arms, etc. to promote qi and blood and unblock the meridians. At the same time, acupuncture is performed on the corresponding acupoints, giving equal emphasis to treatment and replenishment of qi to stimulate the patient's limbs, thereby enhancing the pertinence of the treatment and improving the therapeutic effect. TCM decoction can not only improve the patient's spasm symptoms by nourishing the tendons and relieving pain but also dispel wind and relieve spasms, thereby providing symptomatic treatment and improving the patient's health. By massaging the affected side, it can promote qi, activate blood circulation, dredge meridians, etc., and help improve nerve function, muscles, joints, and tendons, thereby enhancing the patient's daily living ability, improving prognosis, and quality of life.

In this study, the observation group had higher FMA (upper limbs and lower limbs) scores, FAC scores, total clinical efficacy, and Barthel index scores, along with lower PRO scores, tendon reflexes, muscle tone, and clonus scores as compared to those of the control group after treatment ($P < 0.05$). This indicated that the therapeutic effect of comprehensive TCM rehabilitation therapy was more significant for patients with stroke and hemiplegia. It can enhance the patient's daily life and effectively improve their spasticity, limb movement, and walking function. The findings were in accordance with Ju's research results [9].

5. Conclusion

The application of comprehensive rehabilitation therapy of TCM (based on modern rehabilitation training) in patients with stroke and hemiplegia exhibited significant therapeutic effects. It enhanced the patient's daily living ability, spasticity, limb movement, and walking function, thereby improving their quality of life. Hence, this method is worthy of clinical promotion.

Disclosure statement

The author declares no conflict of interest.

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