

Behavioral Therapy Intervention for Recovery of Lower Limb Function and Hemiplegic Early-Stage Stroke Receiving Citicoline Treatment

XIAOLU REN, HAIYING HU, HAIYAN REN AND GUIQI SONG*

School of Nursing, Anhui Medical University, Hefei, Anhui Province 230000, China

Ren *et al.*: Therapeutic Impact of Linking Behavioral Therapy with Citicoline

In order to gain insight into the therapeutic impact of linking behavioral therapy with citicoline, this investigation sought to analyze the effects of such an approach on the lower limb function and self-care ability of hemiplegic patients in the early stages of stroke. A randomized controlled trial was conducted on 150 patients, who were conveniently and randomly divided into study group (n=75) and control group (n=75). The control group received routine drugs in combination with citicoline, while the study group was exposed to behavioral therapy alongside standard care treatment. In order to measure and analyze the comparative differences in lower limb function and daily living ability, the Fugl-Meyer motor function rating scale and Barthel index score scale were employed as scoring metrics for both the study and control groups. Although no significant differences were observed in function rating scale and Barthel index scores between the study and control groups at the beginning of the study, notable distinctions in these scores emerged at the study's conclusion, with significantly higher scores being registered in the study group following treatment. Behavioral therapy intervention on the basis of citicoline and routine drug therapy for hemiplegic patients with early stroke can improve their lower limb function and self-care ability.

Key words: Behavioral therapy, citicoline, lower limb motor function, early stroke, hemiplegia

Stroke is caused by blood circulation disturbance caused by sudden rupture, bleeding or obstruction of cerebral vessels under the influence of a variety of risk factors and then damage brain tissue, and result in high incidence rates and increased disability for those affected. In our country, about 75 % of stroke survivors have hemiplegic sequelae, hemiplegic patients will have a decline in self-care ability, blind self-deprecation, but also bring a heavy burden to the family^[1-3]. Studies have shown that drug therapy, rehabilitation training and other ways are effective in reducing hemiplegic injury^[4]. At the same time, behavioral therapy has a definite effect on the rehabilitation of stroke hemiplegic patients^[5,6]. The goal of this research was to examine whether the amalgamation of behavioral therapy and citicoline had an impact on the ability of hemiplegic individuals who suffered a recent stroke to take care of themselves, as well as the function of their lower extremities. From June 2018 to June 2022, 150 patients who had recently experienced a stroke were randomly separated into two groups; the control group (n=75) and the study group (n=75). Out of

the control group, 41 participants were male and 34 female, with an average age of (61.5±5.7) y, 35 cases of left hemiplegia and 40 cases of right hemiplegia. The study group comprised 39 males and 36 females, with an average age of (59.4±7.2) y. Of the total participants, 37 of them experienced left hemiplegia while 38 of them encountered right hemiplegia. The starting data of both groups manifested no statistical variance and were comparable. The Hospital Ethics Committee provided administrative endorsement for this research. Inclusion criteria conforming to the diagnostic criteria for cerebrovascular disease as defined by the fourth national standard^[7], Magnetic Resonance Imaging (MRI) or Computed Tomography (CT) was diagnosed as the first stroke; there were no other serious complications; did not take other drugs that may interfere with the results of the study; the informed consent form was available. Exclusion criteria have the unconscious and unable to cooperate; there are taboos against the drugs used in the study and self-use of drugs or measures that affect the results of the study. Treatment for the control group patients involved the administration of

*Address for correspondence

E-mail: m15395133304@163.com

0.2 g citicoline sodium, three times a day, plus routine drugs (including anticoagulation, neuroprotection, hypotension, improvement of blood circulation, etc.). Patients in the study group received behavioral therapy intervention on the basis of the above treatment, including cross-promotion training, body rotation and visual scanning; different media were used to train patient's spatial scanning ability during visual training. Optional media include books, newspapers, etc.; body rotation includes upright position, sitting position, supine position, etc., i.e. patients in different positions are driven by healthy limbs to complete the rotation of the body. Cross-promotion training is to use healthy limbs to carry out work and activities on the sick side, including combing hair, wiping skin and so on^[8]. The curative outcomes were assessed after 2 mo of implementing the treatment regimen. The Fugl-Meyer motor scale's lower limb Fugl-Meyer Assessment (FMA) scale was employed to evaluate the lower limb functions of the two groups. The scale obtained a total score of 34, where a higher score indicated a better lower limb function. Activities of daily living for both groups were evaluated based on the Barthel Index, which incorporates a total score of 100. The higher the score, the better the living ability. The presentation of continuous data was accomplished *via* $\bar{x} \pm s$ notation. Intergroup comparison was accomplished employing independent sample t-tests, while paired t-tests were implemented to determine any changes within each group. Results with a $p \leq 0.05$ were recognized as statistically significant. Statistician utilized Statistical Package for the Social Sciences (SPSS) 22.0 software. The initial FMA and Barthel scores shows no statistically significant difference between the two groups prior to initiating treatment, as shown in Table 1. The FMA and Barthel scores were notably higher in the study group following the treatment compared to those in the control group. This difference was deemed statistically significant as shown in Table 2. In particular, both FMA and Barthel scores attained from the study group after treatment were significantly superior to the control group after treatment ($p < 0.05$) as shown in Table 3. Hemiplegia is a common sequela after stroke, which affects patient's limb movement ability, self-care ability and lifestyle quality and exerting a considerable strain on their families^[9,10]. Conventional drug therapy, such as anticoagulation, hypotension and improving circulation, can control the progression of the disease, but it is limited for

the rehabilitation of patients. Therefore, improving the limb motor ability and self-care ability of hemiplegic patients with stroke is the key to lower the chances of disability and enhance their standard of life^[11]. Behavioral therapy is a general term for a kind of psychotherapy techniques, which can guide and stimulate patient's behavior, improve patient's clinical symptoms and correct patient's bad behavior. It comprehensively stimulates the body from the aspects of body, vision and cross-balance training. Gradually guide patients to respond to stimuli in space, cross-balance training can give full play to the function and value of the healthy side of the body. By working on the affected side across the trunk of the body, the living ability of patients can be improved and finally the body condition of patients can be improved^[6]. Behavioral therapy is an effective tool in ameliorating hemiplegic neglect among hemiplegic patients, thereby playing a pivotal role in their treatment. Citicoline is a compound composed of alkali, cytosine, nucleoside and pyrophosphate, which serve as a crucial aspect of nucleotide metabolism. Studies have shown that citicoline can promote the synthesis of phosphocholine, which can improve cognitive and motor function. Citicoline can be completely absorbed by oral administration and its bioavailability is equal to that of intravenous administration. Once absorbed, citicoline cannot only be distributed in various tissues of the body as well as cross the blood-brain barrier, thereby entering the central nervous system^[12,13]. Therefore, the early application of behavioral therapy combined with citicoline holds immense importance in terms of improving both motor function and self-care ability of patients. The current study discovered that a combination of citicoline and conventional drug therapy could significantly improve the motor function of the lower extremities and daily life activities of patients, as evidenced by the heightened FMA and Barthel scores after treatment compared to pre-treatment. Besides, the post treatment FMA and Barthel scores of the study group were considerably superior to those of the control group. It shows that the therapeutic effect can be significantly improved by adding behavioral therapy to the combination of citicoline and conventional drug therapy. To sum up, the intervention of behavior therapy on the basis of citicoline combined with routine drug therapy for hemiplegic patients with early stroke can significantly improve the motor function and self-care ability of lower extremities, which has clinical application value.

TABLE 1: COMPARISON OF FMA AND BARTHEL SCORES BEFORE TREATMENT ($\bar{x}\pm s$)

Group	n	FMA score	Barthel score
Control	75	16.95±3.56	24.45±4.49
Study	75	18.67±2.89	25.20±4.76
t		0.16	0.09
p		>0.05	>0.05

TABLE 2: COMPARISON OF FMA AND BARTHEL SCORES AFTER TREATMENT ($\bar{x}\pm s$)

Group	n	FMA score	Barthel score
Control	75	22.17±3.25	52.61±10.11
Study	75	26.32±2.66	69.16±15.20
t		3.22	4.32
p		<0.05	<0.05

TABLE 3: COMPARISON OF FMA AND BARTHEL SCORES BEFORE AND AFTER TREATMENT ($\bar{x}\pm s$)

Group	n	Time	FMA score	Barthel score
Control	75	Before	16.95±3.56	24.45±4.49
		After	22.17±3.25	52.61±10.11
		t	8.57	7.43
		p	<0.05	<0.05
Study	75	Before	18.67±2.89	25.20±4.76
		After	26.32±2.66	69.16±15.20
		t	9.21	9.01
		p	<0.05	<0.05

Author's contributions:

Xiaolu Ren and Haiying Hu have contributed equally to this work.

Conflict of interests:

The authors declared no conflict of interests.

REFERENCES

- Shi J, Zhang J, Ding K. Effect of Shenqi Tongluo recipe combined with rehabilitation training on neurological function and disability rate in hemiplegic patients with ischemic stroke. *J Liaoning Univ Tradit Chin Med* 2019;27(7):212.
- Chen Y, Qie S, Wang C, Qie S, Wang C. Effects of early comprehensive rehabilitation on peripheral nerve electrophysiology and morphology in patients with hemiplegia after stroke. *Stroke Neurol Dis* 2020;27(5):658-61.
- Li T, Xiong Y, Wang W. Analysis of quality of life and its influencing factors in patients with ischemic stroke. *J Nurs Manag* 1919;3:158-62.
- Wang C, Wang R, Yang J. Meta-analysis of trunk muscle thickness and range of motion in stroke patients with hemiplegia by core stability training combined with routine rehabilitation therapy. *Chin J Rehab Med* 2019;34(9):1065-70.
- Song L. Effect of early rehabilitation training combined with behavioral therapy on lower limb function and walking ability in hemiplegic patients with ischemic stroke. *Chin J Med* 2018;29(2):237-9.
- Ning HH. Effect of early rehabilitation training combined with behavioral therapy on rehabilitation of elderly stroke patients with hemiplegia. *Electron J Clin Med Literature* 2017;4(39):7612-3.
- Chinese Society of Neurology. Diagnostic essentials of various cerebrovascular diseases. *Chin J Neurol* 1996;29(6):379-80.
- Zhu H, Hao L, Zhang X. Analysis of the effect of early rehabilitation training combined with behavioral therapy on elderly stroke patients with hemiplegia. *Anhui Med J* 2015;3(8):499-503.
- Lu K, Han M, Wang X. Effect of acupuncture combined with biofeedback therapy on functional recovery and prognosis of hemiplegia after stroke. *World J Integr Tradit Chin Western Med* 2019;14(8):1171-5.

10. Mi X, Lu Y. Clinical observation of acupuncture combined with rehabilitation in the treatment of hemiplegia after stroke. *Chin Med Clin* 2019;19(16):2855-6.
11. Liu L, Yu F, Chen F. Effect of early individualized comprehensive rehabilitation program on hemiplegic patients with acute ischemic stroke. *J Guangxi Med Univ* 2019;36(6):973-7.
12. Liu J, Yang M. Cognitive effect of citicoline sodium combined with rehabilitation on hemiplegic patients with early stroke. *Massage Rehabil Med* 2012;3(17):19.
13. Xia X, She J, Shan L. Observation on the efficacy of acupuncture combined with rehabilitation training in the treatment of hemiplegia in early stroke. *Shenzhen J Integr Tradit Chin Western Med* 2015;25(22):47-8.

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms

This article was originally published in a special issue, "Drug Development in Biomedical and Pharmaceutical Sciences" Indian J Pharm Sci 2023;85(5) Spl Issue "223-226"