ORIGINAL RESEARCH

Short-Term Effects of Combining Moxibustion Therapy and *Gua sha* on Post-Multiple Cerebral Infarction Rehabilitation

Qiao-Mei Ou, MM; Hui-Ru Yang, MM; Xin-Mei Chen, MM; Hui-Rong Gao, MD

ABSTRACT

Objective • This study aimed to assess the impact of combined moxibustion therapy and *Gua sha* on enhancing functional independence, reducing fall risk, and alleviating pain in patients undergoing post-rehabilitation for multiple cerebral infarctions.

Methods • In a prospective clinical trial, 67 patients diagnosed with multiple cerebral infarctions (age range: 40 to 93 years) were enrolled. Baseline health characteristics included a median hospital stay of 10 days, prevalent medical conditions such as hypertension (64.18%), and various comorbidities like spondylosis (17.91%) and heart disease (14.93%). Patients received moxibustion treatment daily for 20-30 minutes on specific acupoints of the upper and lower extremities. Additionally, *Gua sha* therapy targeting the the head, back, chest, abdomen, and selected acupoints was administered twice a week with an interval of 3 to 4 days. Assessments included Barthel Index (BI) for functional independence, Morse Fall Scale (MFS) for fall risk, and Visual Analogue Scale (VAS) for pain intensity before and after the intervention.

Results • After one week of rehabilitation, significant improvements were observed in the patient's functional independence, as indicated by a median BI score of 100 (IQR: 95-100), compared to the pre-rehabilitation median score of 95 (IQR: 90-100). The MFS score also showed a significant decrease after rehabilitation, with a median score of 35 (IQR: 35-45) compared to the pre-rehabilitation median score of 45 (IQR: 35-45). Additionally, pain intensity significantly decreased, with a median VAS score of 0 (range: 0-2) after rehabilitation, compared to the pre-rehabilitation median score of 0 (range: 0-3).

Conclusion • Combined moxibustion therapy and *Gua sha* demonstrated positive effects on functional independence, fall risk reduction, and pain alleviation in post-rehabilitation for multiple cerebral infarctions. These findings suggest the potential of moxibustion and *Gua sha* as complementary interventions in stroke rehabilitation. The observed improvements in functional independence, fall risk, and pain underscore the potential benefits of these therapies for patients with multiple cerebral infarctions. Further exploration could delve into long-term effects, larger-scale trials, and mechanistic studies to elucidate the underlying pathways of efficacy. (*Altern Ther Health Med.* 2024;30(10):448-453).

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INTRODUCTION

Stroke is a leading cause of death and disability worldwide, resulting in the loss of over 143 million disability-adjusted life years (DALYs) annually. Survivors of stroke often experience a range of physical, psychological, and cognitive impairments, significantly impacting their quality of life.[1] Multiple cerebral infarctions, also known as multiple strokes, are a prevalent neurological condition characterized by the occurrence of multiple ischemic strokes in different areas of the brain.[2] While specific prevalence rates for multiple cerebral infarctions may fluctuate, the condition is acknowledged for its substantial impact on public health due to its recurring nature and diverse effects on those affected. However, precisely pinpointing the exact prevalence rate of multiple cerebral infarctions remains a challenge within the current medical landscape.

Survivors of multiple cerebral infarctions endure a multitude of challenges extending beyond physical limitations, encompassing emotional and psychological ramifications.[3] In addition to motor deficits, impairment in activities of daily living (ADL), and compromised quality of life, individuals often grapple with emotional distress, cognitive deficits, and altered mood states, significantly affecting their overall well-being.[1,4]

Existing research in stroke rehabilitation has shown growing interest in complementary health approaches, including Traditional Chinese Medicine (TCM). Studies exploring TCM modalities such as herbs, acupuncture, moxibustion, and *Gua sha* have indicated their potential benefits in addressing various aspects of stroke recovery.[5,6] Traditional manual acupuncture integrated with rehabilitation therapy is more effective in alleviating pain, improving limb movement and ADL after stroke.[7] However, there remains a paucity of research investigating the effects of these approaches specifically in patients with multiple cerebral infarctions, warranting further exploration.

This study aims to evaluate the impact of combining moxibustion therapy and Gua sha on multiple outcomes among patients affected by multiple cerebral infarctions. Specifically, the study aims to assess the effects of these therapies on functional independence measured by the Barthel Index (BI), fall risk evaluated using the Morse Fall Scale (MFS), and pain levels quantified through the Visual Analogue Scale (VAS). The selection of moxibustion therapy and Gua sha as interventions in this study stems from their rooted principles within Traditional Chinese Medicine. Both therapies emphasize restoring the body's balance, enhancing circulation, and promoting healing. Moxibustion therapy involves burning the herb moxa (*Artemisiae argyi* or mugwort) over acupuncture points to promote healing and alleviate symptoms in various conditions.[8,9] *Gua sha*, also known as coining, is a traditional Chinese folk therapy that involves scraping the skin with a smooth-edged instrument to cause microvascular blood extravasation and bruises, improving blood circulation and stimulating the immune system.[10,11] Practitioners believe that *Gua sha*' rubbing technique removes impurities from stagnant blood within tense and injured muscles, facilitating fresh oxygenated blood flow to promote cellular-level healing.[12]

This investigation aims to address the current knowledge gap by examining the potential efficacy of moxibustion and *Gua sha* in enhancing outcomes for patients with multiple cerebral infarctions. The subsequent sections delineate the methodology utilized, outlining the interventions, assessments, and parameters employed to appraise the impact of moxibustion therapy and *Gua sha* on these specific outcomes within this patient cohort.

METHODS

Participants

A total of 67 patients diagnosed with multiple cerebral infarctions were enrolled in the study between October 2022 and March 2023. The inclusion criteria were as follows: age ≥ 40 years, diagnosis of multiple cerebral infarctions confirmed by neuroimaging, stable medical condition at discharge, ability to provide informed consent, and willingness to undergo the combined therapy. Exclusion criteria included the following: severe cognitive impairment that could hinder participation and compliance, active infections, bleeding disorders or anticoagulant therapy that could pose a safety risk during interventions, contraindications to moxibustion or *Gua sha* therapy, and inability to attend regular treatment sessions. All procedures, including the study design, patient recruitment, data collection, and interventions, adhered to the ethical guidelines and regulations outlined by the Ethics Committee of Haikou People's Hospital. The research team ensured compliance with principles of beneficence, non-maleficence, autonomy, and justice throughout the study process. Furthermore, informed consent was obtained from all participating patients after providing comprehensive information regarding the study objectives, procedures, potential risks, and benefits. Participants were given the opportunity to ask questions and voluntarily decide whether to participate in the study or withdraw their consent at any stage without any impact on their ongoing medical care.

Intervention

All patients underwent a combined therapy of moxibustion and *Gua sha* for a week. Specific acupoints on the upper and lower extremities were selected based on TCM principles and previous research, including Quchi (LI11), Jianyu (LI15), Shousanli (LI10), Waiguan (SJ5), Xuehai (SP10), Yinlingquan (SP9), Sanyinjiao (SP6), and Zhaohai (KI6).[13] A moxa stick (each measuring 3~4 cm in length) was applied to each acupoint. The treatment duration for moxibustion was 20-30 minutes, and the sessions were conducted once daily for a total of 7 consecutive days. *Gua sha* therapy was administered by trained practitioners using a handheld *Gua sha* tool. Specific areas targeted for treatment included the head, back, chest, abdomen, and selected acupoints. For the head, the vasodilation and constriction zones of blood vessels, the midline of the forehead, the sides of the forehead, the posterior one-third of the top of the head, the diagonal band from the vertex to the temple (on the opposite side), and the area from Baihui to Fengfu (GV20-BL10) were treated. For the back, the points targeted were Dazhui (GV14), Shendao (GV11), and the area from Fengmen to Xinyu (BL12-BL15). The chest and abdomen were treated from Shanzhong to Jiuwei (CV17-CV15), and both sides from Qize to Neiguan (PC14-PC6) were treated. Additionally, both sides of Taichong (LR3), Jinggu (GB25), and Fenglong (ST40) were treated. The *Gua sha* therapy was performed twice a week with an interval of 3 or 4 days.

Outcome Measures

Assessments for the Barthel Index (BI), Morse Fall Scale (MFS), and Visual Analogue Scale (VAS) (Table 1) were conducted at two-time points: before the treatment intervention (baseline) and after the completion of the intervention (1 week). The widely utilized measure BI was employed to evaluate the patients' actual performance in ADL and functional independence.[14] The BI scores ranged from 0 to 100 points, with higher scores indicating less disability.[15] The MFS was utilized to identify patients at risk of falling based on a scoring system consisting of six items: 1) recent falls within the last three months; 2) presence of more

Table 1. Detailed scoring criteria for the Barthel Index (BI), Morse Fall Scale (MFS), and Visual Analogue Scale (VAS)

Outcome Measure	Scoring Criteria
Barthel Index (Score range: 0-100)	Feeding (0 = requires total assistance or tube feeding, 5 = requires partial assistance, 10 = independent)
	Bathing (0 = requires assistance, 5 = independent)
	Grooming (0 = requires assistance, 5 = independent for washing face, combing hair, brushing teeth, shaving)
	Dressing (0 = requires total assistance, 5 = requires partial assistance, 10 = independent)
	Bowels control (0 = total incontinence, 5 = occasional incontinence or needs reminders, 10 = able to control)
	Bladder control (0 = incontinent or uses catheter, 5 = occasional incontinence or needs reminders, 10 = able to control)
	Toilet use (0 = requires total assistance for transferring, undressing, cleaning, arranging clothes, flushing, etc., 5 = requires partial assistance, 10 = independent)
	Transfers (0 = requires total assistance, 5 = requires maximal assistance, 10 = requires partial assistance, 15 = independent)
	Mobility on level surfaces (0 = completely dependent, 5 = requires maximal assistance, 10 = requires partial assistance, 15 = independent)
	Stairs climbing (0 = requires total assistance or unable, 5 = requires partial assistance, 10 = independent)
Morse Fall Scale (Score range: 0-125)	Recent falls within the last three months (0 = no, 25 = yes)
	Presence of more than one medical diagnosis (0 = no, 15 = yes)
	Use of walking aids (0 = not needed/bed rest/nurse assistance, 15 = cane/crutch/walker, 30 = wheelchair/gurney)
	Use of medication (0 = no, 20 = yes)
	Gait/transfer (0 = normal/bedridden, 10 = weak/limited mobility in lower extremities, 20 = impaired/disabled)
	Mental status (0 = alert/oriented, 15 = confused/delirious)
Visual Analogue Scale (Score range: 0-10)	No pain (score: 0)
	Mild pain (score: 1~3)
	Moderate pain (score: 4~6)
	Server pain (score: 7~10)

than one medical diagnosis; 3) use of walking aids; 4) use of medication; 5) gait/transfer, and 6) mental status.[16] Additionally, pain levels were evaluated using the VAS.[17] which involved marking a 10-cm straight line to indicate the level of pain perceived by the subject, with 0 representing no pain and values from 1 to 3 indicating mild pain, 4 to 6 indicating moderate pain, and 7 to 10 indicating severe pain.

Statistical analysis

Statistical analysis was performed using GraphPad Prism software. The normality of the data was assessed through the Shapiro-Wilk test and Quantile-Quantile (QQ) plot analysis to evaluate the distribution visually. Descriptive statistics, including mean ± standard deviation (SD) and median ± interquartile range (IQR), were used to summarize the data. Depending on the nature of the data, Wilcoxon matched-pairs signed rank test were utilized. to examine the BI, MFS, and VAS scores before and after treatment. The significance level was set at $P < .05$ to determine the statistical significance of the observed differences.

RESULTS

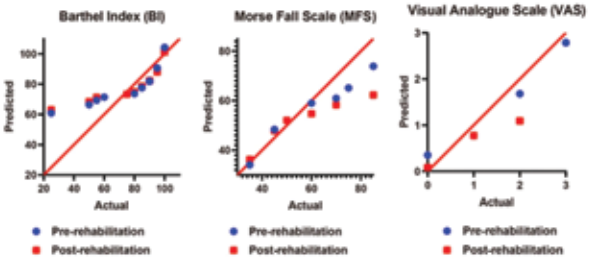
Baseline characteristics of the patients

Table 2 presents the baseline characteristics of the patients included in the study. A total of 67 patients with multiple cerebral infarctions participated in post-rehabilitation using a combination of moxibustion and *Gua sha*. The average age of the patients was 69.51 years (± 10.28), with a median of 65, an IQR from 65 to 78, and a range spanning from 40 to 93 years. The median length of hospital stay was 10 days, with a range of 6 to 18 days. Among the patients, 8.96% were smokers, and 8.96% reported alcohol consumption. A total of 61 patients had a medical history, which accounted for 91.04% of the study population. The most prevalent medical condition among the patients was hypertension, with 43 patients (64.18%) having a history of this condition. Lumbar/cervical spondylosis was reported in 12 patients (17.91%), while 10 patients (14.93%) had a history of heart disease. Gastritis was present in 11 patients (16.42%), and arthritis was reported in 4 patients (5.97%). Pulmonary tuberculosis and hyperlipidemia were each found in 2 patients (2.99% each), while diabetes was present in 13 patients (19.40%). Osteoporosis was observed in 4 patients (5.97%).

Table 2. The baseline characteristics of the patients included in the study

Baseline Characteristics	Number of Patients	Percentage
Age (years)		
Median (range)	69 (40-93)	
Hospital Stay (days)		
Median (range)	10 (6~18)	
Smoking	6	8.96%
Alcohol Consumption	6	8.96%
Medical history		
No	6	8.96%
Yes	61	91.04%
History of Hypertension	43	64.18%
Lumbar/Cervical Spondylosis	12	17.91%
Heart Disease	10	14.93%
Gastritis	11	16.42%
Arthritis	4	5.97%
Pulmonary Tuberculosis	2	2.99%
Hyperlipidemia	4	5.97%
Diabetes	13	19.40%
Osteoporosis	4	5.97%

Figure 1. Quartile-Quartile (Q-Q) plots of Barthel Index (BI), Morse Fall Scale (MFS), and Visual Analogue Scale (VAS) before and after rehabilitation



Normality tests of BI, MFS, and VAS scores before and after rehabilitation

The Q-Q plots revealed significant deviations in the data points from the reference line, indicating a non-normal distribution (Figure 1). To quantitatively evaluate the distribution, the Shapiro-Wilk test was employed with the null hypothesis stating that the data followed a normal distribution. However, the null hypothesis was rejected as all test results yielded $P < .001$. Subsequently, we utilized the Wilcoxon matched-pairs signed rank test to examine the BI, MFS, and VAS scores before and after treatment.

Figure 2. Effects of combined moxibustion therapy and *Gua sha* on the scores of Barthel Index (BI, A), Morse Fall Scale (MFS, B), and Visual Analogue Scale (VAS, C) before and after rehabilitation. Data were presented as median ± interquartile range (IQR) and analyzed by Wilcoxon matched-pairs signed rank test.

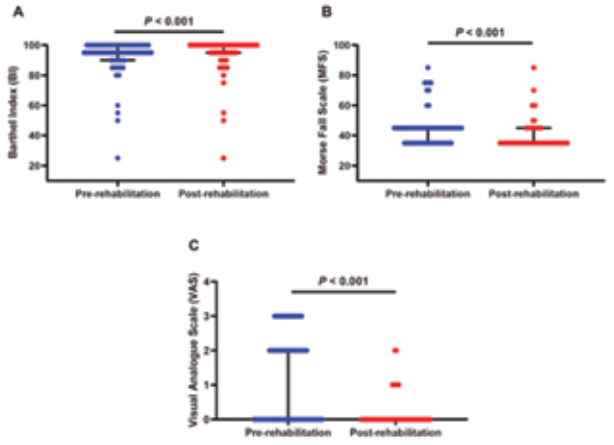


Table 3. Effects of combined moxibustion therapy and *Gua sha* on Barthel Index (BI), Morse Fall Scale (MFS), and Visual Analogue Scale (VAS) in post-multiple cerebral infarction rehabilitation

	Minimum	25% Percentile	Median	75% Percentile	Maximum	Mean	SD
BI score							
Pre-rehabilitation	25	90	95	100	100	92.31	12.89
Post-rehabilitation	25	95	100	100	100	93.96	12.69
MFS score							
Pre-rehabilitation	35	35	45	45	85	45.00	11.87
Post-rehabilitation	35	35	35	45	85	39.48	9.38
VAS score							
Pre-rehabilitation	0	0	0	2	3	1.194	1.270
Post-rehabilitation	0	0	0	0	2	0.149	0.435

Effects of combined moxibustion therapy and *Gua sha* on BI score and MFS score in post-multiple cerebral infarction rehabilitation.

Prior to rehabilitation, the median BI score was 95 (IQR: 90-100). Following one week of rehabilitation, there was a significant improvement in functional independence, with a median BI score of 100 (IQR: 95-100). The Wilcoxon matched-pairs signed rank test showed a highly significant difference in BI scores before and after rehabilitation (Sum of signed ranks = 156, $P < .001$, Figure 2A and Table 3). The notable increase in median BI score from 95 to 100 within a week suggests an overall improvement in functional independence, potentially leading to greater autonomy and improved quality of life for the patients. Before rehabilitation, the median MFS score was 45 (IQR: 35-45), which decreased to 35 (IQR: 35-45) after rehabilitation (Sum of signed ranks = -528, $P < .001$, Figure 2B and Table 3). The marked decrease in MFS scores post-rehabilitation suggests a reduced fall risk among patients. This improvement in fall risk assessment scores may indicate enhanced stability, reduced susceptibility to falls, and potentially fewer fall-related injuries, thus contributing to improved overall safety and well-being.

Effects of combined moxibustion therapy and *Gua sha* on pain intensity in post-multiple cerebral infarction rehabilitation.

Among the 67 patients, VAS scores prior to rehabilitation did not exceed 3 points [median: 0, range: 0~3]. After the rehabilitation period, there was a notable decrease in the median VAS score to 0 (range: 0-2). Statistical analysis confirmed a significant difference (Sum of signed ranks = -561, $P < .001$, Figure 2C and Table 3) between the pre- and post-rehabilitation VAS scores, indicating the positive impact of the combined therapy in reducing pain intensity in post-multiple cerebral infarction rehabilitation. The main sites of pain and their corresponding percentages were as follows: lower back (n = 15, 22.4%), neck (n = 13, 19.4%), shoulders (n = 3, 4.5%), lower limbs (n = 1, 1.5%), head (n = 4, 6.0%), epigastric region (n = 1, 1.5%), and back (n = 1, 1.5%). Joint pain was reported in the following areas: knee joints (n = 9, 13.4%), shoulder joints (n = 2, 3.0%), sacroiliac joints (n = 1, 1.5%), multiple joints throughout the body (n = 1, 1.5%), and the wrist joint and left thumb joint (n = 1, 1.5%). The distribution of pain sites reported post-rehabilitation reveals a diverse spectrum of pain locations, suggesting that the moxibustion and *Gua sha* therapy might have beneficial effects on various pain areas, including joint-related pain and musculoskeletal discomfort.

DISCUSSION

Stroke and multiple cerebral infarctions are significant global health concerns that result in high disability rates and reduced quality of life for survivors.[18] The development of effective rehabilitation strategies is imperative for promoting recovery and improving functional outcomes in individuals dealing with multiple cerebral infarctions.[19-21] Complementary health approaches and TCM have gained attention as potential interventions for stroke patients due to their potential benefits in improving neurological conditions and functional outcomes.[22,23]

The findings of this study hold significant implications for clinical practice, specifically regarding the integration of moxibustion and Gua sha therapy into stroke rehabilitation programs. These traditional therapies showcase potential as supplementary interventions, augmenting the effectiveness of conventional treatment approaches. Their incorporation might offer an added dimension to stroke rehabilitation by potentially enhancing functional independence, mitigating fall risk, and managing pain among patients with multiple cerebral infarctions.

Previous studies support the efficacy of moxibustion in stroke rehabilitation. Liu F *et al.* conducted a systematic review that found evidence supporting the effectiveness of moxibustion in improving cognition and ADL in patients with post-stroke cognitive impairment.[24] Another systematic review of meta-analyses by Garcia-Rudolph A *et al.* demonstrated that moxibustion, Tai Chi, and acupuncture showed the greatest improvements in ADL for stroke patients during the subacute phase.[25] Combination therapy with

moxibustion and rehabilitation training has shown greater clinical benefits in relieving spasticity, promoting motion recovery, improving ADL performance, and increasing quality of life in post-stroke spastic hemiplegic patients compared to rehabilitation training alone.[26] Moxibustion, in combination with acupuncture treatment, has been found to alleviate post-stroke shoulder pain, improve upper limb motor function and ADL performance, and alleviate patients' depression,[27] Jiang X *et al.* revealed that moxibustion therapy, compared to conventional treatments, was more favorable in terms of ADL and demonstrated effectiveness and safety in the treatment of vascular dementia.[28] Notably, across various conditions like insomnia, cephalic version of breech presentations, and cancer-related fatigue, moxibustion exhibited a favorable safety profile with no serious adverse effects reported.[9,29,30]

Previous studies have consistently supported the efficacy and safety of moxibustion in various aspects of stroke rehabilitation. Liu F et al.'s systematic review highlighted its effectiveness in enhancing cognition and activities of daily living (ADL) among patients with post-stroke cognitive impairment.[24] Garcia-Rudolph A et al.'s meta-analysis emphasized the significant improvements in ADL during the subacute phase of stroke when using moxibustion, Tai Chi, and acupuncture.[25] Combining moxibustion with rehabilitation training showed enhanced benefits in relieving spasticity, promoting motion recovery, and improving ADL performance in post-stroke spastic hemiplegic patients.[26] Furthermore, moxibustion, in conjunction with acupuncture, was found to alleviate post-stroke shoulder pain, enhance upper limb motor function, and alleviate depression.[27] Additionally, Jiang X et al. demonstrated moxibustion's effectiveness and safety in treating vascular dementia while favorably impacting ADL.[28] Notably, across various conditions like insomnia, cephalic version of breech presentations, and cancer-related fatigue, moxibustion exhibited a favorable safety profile with no serious adverse effects reported.[29,30]

Similarly, *Gua sha*, an ancient practice involving skin scraping, has shown positive effects in several conditions. Post-scraping, the resulting "*sha*" contains metabolites and blood exudate, aiding in restoring capillary permeability and improving blood circulation, lymphatic flow, and interstitial fluid movement.11 The presence of blood exudate, rich in nutrients and oxygen, allows for normal coagulation function. This process restores the permeability of capillaries, transforming them from obstructed to smooth flow and promoting the circulation of blood, lymph, and interstitial fluid. These changes alleviate hypoxia, activate cells, stimulate and regulate organ function, and restore the body's inherent healing ability.[31] *Gua sha* has been found to be a safe and effective treatment for chronic low back pain, reducing pain intensity and improving overall health status.[32] In elderly patients with chronic low back pain, *Gua sha* has shown a more long-lasting anti-inflammatory effect compared to hot packs, providing pain relief and improved mobility.[33] *Gua sha* therapy has also demonstrated significant reductions in neuropathy symptoms, improved sensory function, reduced peripheral artery disease, and better glucose control in patients with diabetic peripheral neuropathy.[34] *Gua sha* was widely believed to be beneficial to health and predominantly practiced on a non-regular basis for treating illnesses, with respiratory and pain problems being the top two common ailments among both male and female users, accounting for 74% of all cases in the Hong Kong community.[35] Furthermore, studies involving chronic neck pain, chronic low back pain, and diabetic peripheral neuropathy showed no reported adverse events post-*Gua sha* therapy.[34,36]

The observed improvements in BI, MFS and VAS scores post-moxibustion and Gua sha therapy hold substantial clinical significance. Enhanced functional independence potentially translates to improved daily activities and overall well-being. Reductions in fall risk and pain intensity also suggest meaningful enhancements in patients' lives, possibly leading to better quality of life and increased autonomy. Clinicians and healthcare providers working with stroke patients could consider integrating moxibustion and Gua sha therapy into rehabilitation programs. These complementary treatments might optimize patient care, offering additional avenues for improving recovery outcomes and enhancing overall well-being. It's crucial to acknowledge the limitations of this study, such as the single-arm pre-post intervention design without a control group, short follow-up duration, and absence of a power analysis. These limitations affect the study's generalizability and warrant future investigations involving randomized controlled trials with larger sample sizes and extended follow-up periods to ascertain the sustained effects of these interventions.

CONCLUSION

This research contributes to advancing our understanding of effective interventions in stroke rehabilitation and complementary medicine. Understanding the potential benefits of moxibustion and Gua sha therapy within this context offers insights that could optimize stroke survivor care. The combination of moxibustion therapy and Gua sha demonstrates promise in improving functional outcomes, reducing fall risk, and managing pain intensity in patients with multiple cerebral infarctions. The findings might inform rehabilitation protocols by highlighting the potential benefits of incorporating these therapies into clinical practice, potentially optimizing the recovery process for individuals with multiple cerebral infarctions.

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COMPETING INTERESTS
The authors declare that they have no competing interests.

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