MedPharmRes

journal of University of Medicine and Pharmacy at Ho Chi Minh City
homepage: http://www.medpharmres.vn/ and http://www.medpharmres.com/

Original article

The efficiency of combining modified acupuncture and motor relearning method on post-stroke patients

Minh-Man Pham Bui[a], Van-Dan Nguyen[a], Hoai-Nam Thai[b], Dieu-Thuong Thi Trinh[a*]

[a]*Faculty of Traditional Medicine, University of Medicine and Pharmacy at Ho Chi Minh City, Vietnam;*
[b]*University Medical Center Ho Chi Minh City, Vietnam.*

Received January 08, 2019: Revised February 13, 2019: Accepted March 04, 2019

Abstract: ***Background and Objectives:*** Combining modern medicine and traditional medicine in the rehabilitation of post-stroke motor deficit has shown interesting results. Many studies on modified acupuncture, a combination of modern and traditional techniques, have proven its effectiveness in motor rehabilitation in post-stroke patients. Furthermore, the effectiveness of the motor relearning method in the treatment of post-stroke paralysis has been elucidated. Therefore, our study aims to determine whether the combination between modified acupuncture and motor relearning method can improve treatment outcomes. ***Method:*** Multicenter randomized controlled trial (Traditional Medicine Hospital of Ho Chi Minh City, General Hospital of Soc Trang Province, and People Military Hospital of Soc Trang Province) from July 2014 to July 2015. 66 post-stroke patients were divided into two groups: The control group received modified acupuncture combined with Bobath method, and the trial group received modified acupuncture combined with motor relearning method. After six weeks, patients were evaluated according to the Barthel score, the 10-hole test, and the ability to walk. ***Results:*** The trial group showed better results than the control group. There was a significant difference between the two groups in the Barthel score and the ability to walk, excluding the 10-hole test. After treatment, 77.42% of patients in the trial group showed improvement compared to only 51.61% in the control group ($P < 0.05$). ***Conclusion:*** The combination of modified acupuncture and motor relearning method is more effective than the combination of modified acupuncture and Bobath method in the rehabilitation of motor deficit after stroke.

Keywords: Modified acupuncture; Motor relearning; Bobath; Barthel score; 10-hole test.

1. INTRODUCTION

According to the World Health Organization, 15 million people suffer stroke worldwide each year. Within this number, five million die and another five million are permanently disabled [12]. In Vietnam, about 200,000 stroke patients are recorded per year, in which 51.9% suffer from the motor deficit [6]. The combination of modern medicine and traditional medicine in the rehabilitation of motor deficit after stroke has shown interesting results. Many studies on modified acupuncture, a combination of modern and traditional techniques, have proven its effectiveness in motor rehabilitation in post-stroke patients [10, 11]. Modified acupuncture is quite similar to neuromuscular electrical stimulation. However, the neuromuscular electrical stimulation does not perform percutaneously; therefore, it is difficult to affect the inner muscles and contract selective muscles. Furthermore, many studies have elucidated the effectiveness of the motor relearning method in the treatment of post-stroke paralysis [3, 5]. Therefore, this study aims to determine whether the combination of modified acupuncture and motor relearning method can improve the treatment results.

*Address correspondence to Assoc. Prof., Dr. Trinh Thi Dieu Thuong at Faculty of Traditional Medicine, University of Medicine and Pharmacy at Ho Chi Minh City, Vietnam; E-mails: thuong.ttd@ump.edu.vn
DOI: 10.32895/UMP.MPR.3.1.17

2. METHOD

Our study was a multicenter randomized controlled trial conducting on 66 post-stroke patients at Traditional Medicine Hospital of Ho Chi Minh City, General Hospital of Soc Trang Province, and People Military Hospital of Soc Trang Province from July 2014 to July 2015. This study was approved by Ethics Board in Biomedical Research at University of Medicine and Pharmacy at Ho Chi Minh City.

The inclusion criteria were: the patients had to be fully aware and cooperative, their Barthel scores were ≤ 60 and they agreed to participate in the research. Stroke patients with ulceration, inflammation or cachexia due to lengthy lying on bed, or those who had complicated changes that needed other treatments during the research process were excluded.

The following variables were collected: Barthel score, Barthel rank, 10-hole test in one minute and three minutes for upper limbs, the ability to walk for lower limbs. Patients were divided into two groups randomly by GraphPad Software. The control group received modified acupuncture and the Bobath method, which were current methods using in the researched hospitals, while the trial group received modified acupuncture and motor relearning program.

Modified acupuncture comprised three steps. Step one: Identifying weak or paralyzed muscles. Step two: Three pairs of acupoints were selected on both ends of the weak or paralyzed muscles, three pairs on the upper limb and three pairs on the lower limb. Step three: Patients were given electro-acupuncture in 20 minutes. This process was conducted 1 time/day from Monday to Friday until finishing 30 days of treatment.

Patients in the control group did exercises with 4 different positions including lying position (rolling onto paralyzed slide, rolling onto healed side, exercising paralyzed arm, paralyzed leg, paralyzed shoulder, and putting weight on leg, etc.), sitting position (sitting up, balancing while sitting, moving with buttocks, moving from bed to chair, controlling torso, exercising arm, and exercising leg), standing position (putting weight on non-paralyzed leg, putting weight on paralyzed leg, and exercising torso), and walking exercise [9].

Patients in the trial group did 4 specific tasks, including balancing, walking, standing up – sitting down, and reaching – manipulation. In each task, the exercises were conducted based on patients' ability and performance. Every day, patients did the four exercises at least once, and the tasks were repeated based on the patients' health status. Before exercising, patients were checked for vital signs. If the blood pressure was higher than 140/90 mmHg, they would not exercise that day [1, 2].

Every 10 days of treatment, patients were checked for vital signs, such as Barthel score, Barthel rank, were tested the ability to walk, and did the 10-hole test in one and three minutes.

Data were processed by Microsoft Excel 2007, and analyzed by STATA 10.0. We used the chi-square test to compare the patients' status before treatment, to compare the ability to walk between two groups before and after treatment. The t-test was used to compare the treatment effects in upper limbs rehabilitation per 1 minute and 3 minutes, the Barthel score in each period of time between two groups and paired t-test was used to compare the treatment effects in upper limbs rehabilitation per 1 minute and 3 minutes, the Barthel score before and after treatment in each group.

3. RESULTS AND DISCUSSION

There was no statistically significant difference between the two groups in population traits, stroke histories, and accompanying diseases (Table 1 and Table 2).

Table 1. Population traits and stroke history of the two groups

Population traits and Stroke history	Control group		Trial group	
	No.	%	No.	%
Age				
< 50 years old	5	15.15	6	18.18
≥ 50 years old	28	84.85	27	81.82
Gender				
Female	19	57.58	16	48.48
Male	14	42.42	17	51.52
Time period from suffering stroke to treatment				
≤ 1 month				
> 1 month	23	69.70	22	66.67
Coma	10	30.30	11	33.33
No				
Yes	30	90.91	31	93.94
Times of stroke	3	9.09	2	6.06
1st time				
≥ 2nd time	26	78.79	27	81.82
	7	21.21	6	18.18

No statistically significant difference between the two groups (P > 0.05, chi-square test)

Concerning upper limbs rehabilitation, both groups showed good results after treatment. The rings when doing the 10-hole test in one and three minutes of both groups were increased significantly (P < 0.0001). However, there was no statistically significant difference between the two groups (P > 0.05) (Table 3, Figure 1, and Figure 2).

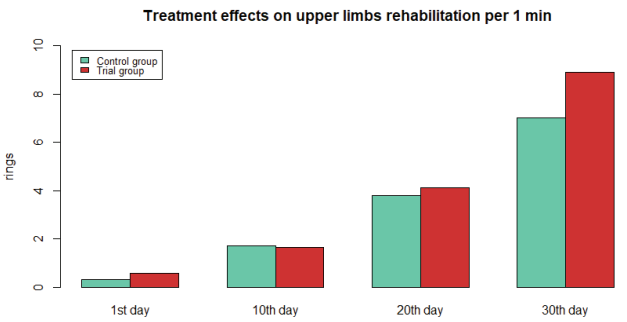

Figure 1: Treatment effects in upper limbs rehabilitation per 1 min

Table 2. Population traits and stroke history of the two groups

Accompanying diseases	Control group		Trial group	
	No.	%	No.	%
Hypertension				
No	5	15.15	6	18.18
Yes	28	84.85	27	81.82
Cardiovascular diseases				
No	27	81.82	24	72.73
Yes	6	18.18	9	27.27
Diabetes				
No	26	78.79	25	75.76
Yes	7	21.21	8	24.24
Obesity				
No	26	78.79	25	75.76
Yes	7	21.21	8	24.24
Dyslipidemia				
No	17	51.52	18	54.55
Yes	16	48.48	15	45.45

No statistically significant difference between the two groups (P > 0.05, chi-square test)

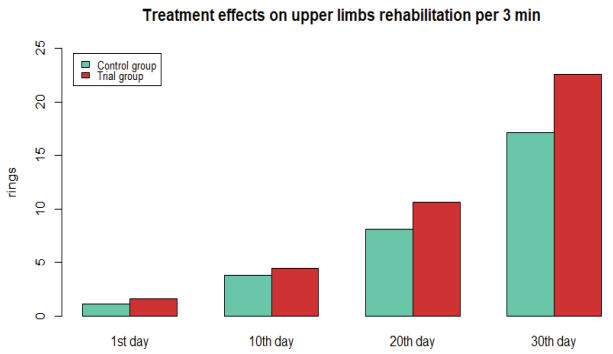

Figure 2: Treatment effects in upper limbs rehabilitation per 3 min

Both groups showed statistically significant differences in the 10-hole test in one minute and three minutes between the 1st day and the 30th day with P < 0.05 (paired t-test). However, there was no statistically significant difference in 10-hole test in one minute and three minutes between two groups (P > 0.05, t-test).

Concerning upper limbs rehabilitation, both groups showed good results after treatment. The rings when doing the 10-hole test in one and three minutes of both groups were increased significantly (P < 0.0001). However, there was no statistically significant difference between the two groups (P > 0.05) (Table 3, Figure 1, and Figure 2).

Concerning lower limbs rehabilitation, both groups showed good results after treatment. The patients' walking competencies of both groups were increased significantly (P < 0.05). However, the trial group showed statistically significantly better results in lower limbs rehabilitation than the control group after 30 days of treatment (P < 0.05) (Table 4, Figure 3).

Concerning general rehabilitation after treatment, both groups showed good results (P < 0.0001). However, the trial group showed statistically different better results in general

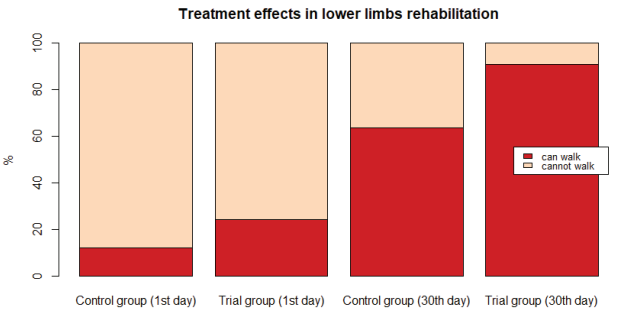

Figure 3: Treatment effects on lower limbs rehabilitation

There was no statistically significant difference between the proportion of patients who can walk before treatment in control group and in trial group (P > 0.05, chi-square test). Also, there was no statistically significant difference between the proportion of patients who cannot walk before treatment in control group and in trial group (P > 0.05, chi-square test). However, the proportions of patients who can/cannot walk after treatment in control group and in trial group were statistically significantly different (P < 0.05, chi-square test).

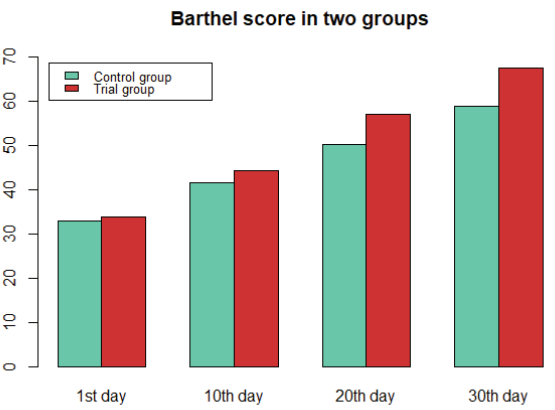

Figure 4: Barthel score in the two groups

Both groups showed statistically significant differences in Barthel score between the 1st day and the 30th day (paired t-test). Remarkably, there was statistically significant difference in Barthel score between two groups on the 30th day (P < 0.05, t-test).

rehabilitation than the control group after 30 days of treatment (P < 0.05). The total patients' score and the patients' rate in Good–Fair rank were increased significantly (P < 0.0001) (Table 5, Figure 4, and Figure 5).

Both treatments of the two groups took advantages of modified acupuncture. Modified acupuncture does not apply only traditional medicine's theory (all acupoints selected were on the injured meridians as the acupoints on paralyzed limbs were used), but also modern medicine's theory (all acupoints selected were on both ends of the weak or paralyzed muscles for better muscles contraction). Moreover, modified acupuncture applies electrical therapy by low-frequency electrical stimulation which can help rehabilitate the weak or paralyzed muscles. Last but not least, modified acupuncture also applies the neurobiology`s theory; as once proprioceptive sensory inputted in muscles are stimulated, it can stimulate both the sensory and the motor cortex [8, 11].

Table 3. Treatment effects: upper limbs rehabilitation

T	Control group		Trial group		P value
	Mean	SD	Mean	SD	
1 min	Rings		Rings		
1st day	0.3	1.04	0.57	1.87	0.47
10th day	1.72	3.62	1.64	3.69	0.92
20th day	3.79	5.91	4.12	5.89	0.82
30th day	7	8.62	8.9	9.12	0.4
Difference between 1st day and 30th day	***P = 0.0002***		***P < 0.0001***		
3 mins	Rings		Rings		
1st day	1.09	2.68	1.6	5.51	0.63
10th day	3.81	6.9	4.45	10.58	0.77
20th day	8.12	11.67	10.6	16.08	0.48
30th day	17.09	22.19	22.61	24.65	0.34
Difference between 1st day and 30th day	***P = 0.0004***		***P = 0.0001***		

Table 4. Treatment effects: lower limbs rehabilitation

	Control group		Trial group		P value
	No.	%	No.	%	
1st day					
can walk	4	12.12	8	24.24	0.202
cannot walk	29	87.88	25	75.76	
30th day					
can walk	21	63.64	30	90.91	**0.017**
cannot walk	12	36.36	3	9.09	

Table 5. General rehabilitation according to the Barthel score

Barthel score	Control group		Trial group		P value
	Mean	SD	Mean	SD	
1st day	33.03	10.07	33.93	10.81	0.725
10th day	41.51	11.62	44.24	12.51	0.362
20th day	50.15	15.68	56.96	13.57	0.063
30th day	58.87	16.41	67.58	13.53	**0.022**
Difference between 1st day and 30th day	***P < 0.0001***		***P < 0.0001***		

The Bobath method had two main purposes: spasticity prevention and rehabilitation of voluntary motor function in the paralyzed side. As a result, all exercises were focused on decreasing joint stiffness and enhancing muscle strength. Besides, the exercises used for each patient were similar according to patients' stage of disease and patients' health status (passive exercises, partly active exercises or active exercises).

The motor relearning program had two main purposes: facilitating brain reorganization and functional recovery. This method helped patients actively rehabilitate with intensive exercises. It promoted both physical and mental activities, as well as skills acquisition. The exercises used for each patient were different. This method is based on: First, there is functional plasticity after stroke associated with task-oriented exercise; second, training in real-life tasks can

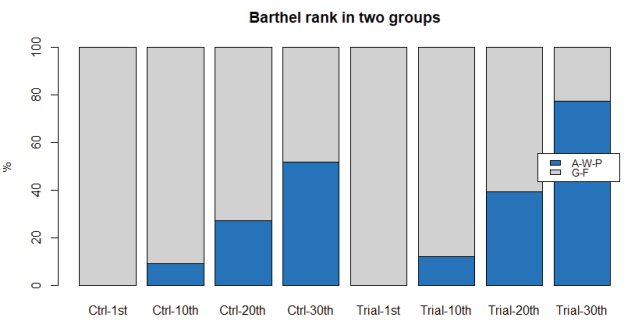

Figure 5: Barthel rank in the two groups

Two groups showed statistically significant differences in Barthel rank between the 1st day and the 30th day with P < 0.0001 (chi-square test). Remarkably, there was statistically significant difference in Barthel rank between two groups on the 30th day (P < 0.05, chi-square test).

be a stimulus to make more functional connections within the remaining brain tissue and to form new synapses [1].

The reason why the trial group showed better results than the control group can be explained in two ways. In one way, in the control group, only one method supported brain reorganization while both methods in the trial group could facilitate brain reorganization. This opinion was also proven in many researches which stated that the combination of physical therapy and mental exercise was good for motor rehabilitation. In the other way, in the trial group, patients did specific tasks in real life with a real object. When performing a concrete task involved meaningful interactions with an object, patients demonstrated superior motor performance compared to an abstract task with no object involved [1].

4. CONCLUSION

The combination of modified acupuncture and motor relearning method is more effective than the combination of modified acupuncture and Bobath method in the rehabilitation of motor deficit after stroke.

ACKNOWLEDGEMENTS

Funding for this study was provided in part by research grants from the Department of Science and Technology, Soc Trang province.

REFERENCES

1. Carr JH, Shepherd RB. Stroke rehabilitation. 1st ed. China: RDC Group Limited. 2003.
2. Carr JH, Shepherd RB. A motor relearning model for rehabilitation. In: Carr JH, Shepherd RB, editors. Movement science: Foundations for physical therapy in rehabilitation. Rockville: Aspen Publishers. 1987.
3. Chan DYL, Chan CCH, Au DKS. Motor relearning programme for stroke patients: a randomised controlled trial. Clinical rehabilitation. 2006;20:191-200.
4. Ha THL, Phan QCH. Rehabilitating effect on motor deficit after stroke of a revised method of acupuncture. Y Hoc TP. Ho Chi Minh. 2005;9(2): 64-72.
5. Krutulyte G, Kimtys A, Krisciūnas A. [The effectiveness of physical therapy methods (Bobath and motor relearning program) in rehabilitation of stroke patients]. Medicina (Kaunas). 2003;39(9):889-95.
6. Le VT, Nguyen TKL et al. New advancements in stroke treatment and stroke unit. Y Hoc TP. Ho Chi Minh. 2011;65: 9-11.
7. Nguyen DK, Pham TNA et al. Effectiveness of the motor relearning programme compared with the traditional approach on the chronic stroke patients. Y Hoc TP. Ho Chi Minh. 2012;16(4):76-82.
8. Phan QCH. Motor rehabilitation after stroke by modified acupuncture. 2013. pp 24-32. Located at: University of Medicine and Pharmacy.
9. Tran VC. Rehabilitation on motor deficit patients after stroke. Medical publishing house; 2010; pp 15-40.
10. Trinh TDT, Phan QCH. Improving the treatment of motor deficit after stroke with a combination of new method of acupuncture and active exercise. Y Hoc TP. Ho Chi Minh. 2008;12(4):18-27.
11. Trinh TDT, Phan QCH. Improving the treatment of motor deficit after supratentorial ischemic stroke with a combination of new method of acupuncture and active exercise. Y Hoc TP. Ho Chi Minh. 2013;17(1):25-33.
12. Rodgers A, Vaughan P. The world health report 2002: Reducing risks, promoting healthy life [Internet]. France: World Health Organization;2002 [cited 2015]. Available from: http://www.who.int/whr/2002/en/whr02_en.pdf?ua=1