PILOT STUDY

Comparison of SAME verses CIMT on upper-limb functions in chronic stroke: A pilot randomized control trial

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Abstract

Objective: To compare the effects of Same Arm Movement Therapy versus Constraint Induced Movement Therapy in improving upper-limb functions in patients of chronic stroke.

Method: The pilot, assessor-blind, randomised control trial was conducted from February to September 2020 at the Spine and Physiotherapy Rehab Centre, Riphah Rehabilitation Centre, Lahore, Pakistan, and comprised patients of either gender aged 30-60 years having any type of stroke for a minimum 3 months. They were randomised into group A which received same arm movement therapy for 8 weeks of mental rehearsal of upper limb movements during 45min supervised sessions three times a week and structured independent sessions twice a week, and group B which received constrain induced movement therapy for eight weeks of daily intensive training of the affected extremity for two hours per day, five days per week for eight weeks in association with restriction of the non-affected extremity for 10 hours a day. Measurements were taken at baseline and post-intervention. Data was analysed using SPSS 21.

Results: Of the 22 patients, 5(22.7%) were male and 17(77.3%) were female. The average age in group A was 54.91±5.89 years compared to 53.18±6.61 years in group B. All 22(100%) patients had ischaemic stroke. Intragroup comparisons showed significant progress in both groups ($p<0.05$), but intergroup comparisons showed non-significant differences ($p>0.05$).

Conclusion: Both the study interventions had similar effect on upper limb functions among chronic stroke patients.

Keywords: Stroke, Therapy, Upper limb, Functions, CIMT, SAME.

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Introduction

Stroke arises from a vascular cause which can either be a cerebral infarction or any type of haemorrhage.[1] This leads to disturbance in the central nervous system (CNS) causing focal CNS injury and leads to the development of a variety of sensory, motor and cognitive clinical symptoms of both upper and lower limbs.[2] Upper limb impairments lead to severe disability. The core element for the treatment of stroke survivors is improving the arm's function because it enhances the quality of life (QOL) of such patients.[3]

Different rehabilitation approaches are in use for stroke management, including the Constraint-Induced Movement Therapy (CIMT) which is mainly used to treat the upper extremities for stroke patients.[4] Most of the work with CIMT has involved constraining the use of the unaffected upper extremity, while forcing the affected upper extremity to practice various motor tasks.[5] The hours and time of practice are decided according to the desire and interest of the patient.[6] The time after which patients can become significantly better is not specific as it depends among other things on the patients' willpower.[7] The Same Arm Movement Therapy (SAME) is also considered effective in treating upper limb impairment after stroke. SAME is a new concept based on observational theory. In this activity, patients are allowed to perform functions with the sound side due to which patients repeat the activity with the affected side. The valid approach for this treatment is action observation, which explains that when patients observe the activity, the activity is saved in motor-limb. Thus, when the mind is activated due to practice with the unaffected part, the brain becomes activated and tried to repeat the same procedure with the unaffected part.[8] The coupling effect is also produced from the sound limb because nerves of the unaffected part become activated. Literature suggests that combination of both therapies produce better results in patients post-stroke.[9]

CIMT and SAME therapies involve treatment over a short period of time. Both interventions are associated with the activation of the brain so that the affected part can also perform normal functions.[10]

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The current study was planned to compare the effect of SAME and CIMT in in improving upper-limb functions in patients of chronic stroke.

Patients and Methods

This was a pilot study, assessor-blind, randomised control trial (RCT) was conducted from February to September 2020 at the Spine and Physiotherapy Rehab Centre, Riphah Rehabilitation Centre, Lahore, Pakistan. The RCT was registered with the Iranian Registry of Clinical Trials (#IRCT20200620047848N1). After approval from the Research Ethics Committee of Riphah International University's Lahore campus, the sample size was calculated using OpenEpi version 3 with 95% confidence interval (CI) and power 80% in line with literature.[11] The sample was raised using non-probability convenience sampling technique. Those included were patients of either gender aged 30-60 years having any type of stroke for a minimum 3 months, and disability level 1-4 on the Modified Rankin scale (MRS).[12] Patients were not considered for participation in the trial if: They were discharged from hospital within 1 week. Patients with implants such as Neuro stimulator containing electric circurity and implants generating electric sign. Patients with anxiety and claustrophobia with diagnosed psychological disorder. Patients undergoing chemotherapy. Alcohol dependency or evidence of substance abuse. Patients without any visual-perceptual problems. Patients without any communication barriers/language issue. Patients with no significant cognitive impairments. Written informed consent was obtained from each participant prior to data collection.

They were randomised using the sealed envelope method into group A which received SAME for 8 weeks of mental rehearsal of upper limb movements during 45min supervised sessions three times a week and structured independent sessions twice a week, and group B which received CIMT for eight weeks of daily intensive training of the affected extremity for two hours per day, five days per week for eight weeks in association with restriction of the non-affected extremity for 10 hours a day.

Wolf motor function test (WMFT) was used to assess the upper limb motor function in the subjects. This included 2 strength-based tasks and 15 functionality-based tasks.[13] Action research arm test (ARAT) was used to assess the upper limb functions of grasping, gripping, pinching and gross arm movement.[14] Bilateral task-oriented exercises were applied to group A, while unilateral task-oriented exercises were applied to group B. Task-oriented exercises included swing exercise, pushing away exercise, hands-on-table, and reaching activities, while for grasps and grip improvement, cylinder grip exercise and object pinch exercises were included. Measurements were taken at baseline and post-intervention. One therapist provided the treatment to all the participants, while the outcomes were documented by the other therapist.

Data was analysed using SPSS 21. After checking data normality with Shapiro Wilk test, independent sample t-test was used for intergroup analysis and paired sample t-test for intragroup analysis. $P<0.05$ was considered statistically significant.

Results

Of the 26 individuals assessed, 22(84.6%%) were included (Figure); 5(22.7%) male and 17(77.3%) female. The mean age in group A was 54.91±5.89 years compared to 53.18±6.61 years in group B. All 22(100%) patients had ischaemic stroke, 14(46.7%) had left hemiplegic side and

Table-1: Inter-group analysis of WMFT and ARAT.

Variable	Groups	Pre Intervention Mean±SD	p- value	Post Intervention Mean±SD	p- value
WMFT Functional Ability Scale	SAME	37.81± 8.63	0.67	48.54± 8.13	0.44
	CIMT	37.09±9.63		49.09±10.3	
Performance Time	SAME	28.09± 3.780	0.87	23.54± 4.13	0.11
	CIMT	29.27±4.64		23.5±4.12	
ARAT	SAME	24.43±6.50	0.99	37.93±5.61	0.45
	CIMT	23.18±6.99		39.01±6.54	

SD; Standard deviation, WMFT: Wolf motor function test. ARAT: Action research arm test, SAME: Same arm movement therapy, CIMTT: Constraint induced movement therapy.

Table-2: Intra-group analysis of the SAME group.

Variable	Pre-Intervention Mean±SD	Post-Intervention Mean±SD	p-value
Wolf Motor			
Functional Ability Scale	37.81±1.507	48.45±8.08	0.001
Performance Time	28.09±3.72	23.33±6.230	0.001
ARAT	24.45±6.96	37.00±6.54	0.001

SAME: Same arm movement therapy, SD: Standard deviation, WMFT: Wolf motor function test. ARAT: Action research arm test.

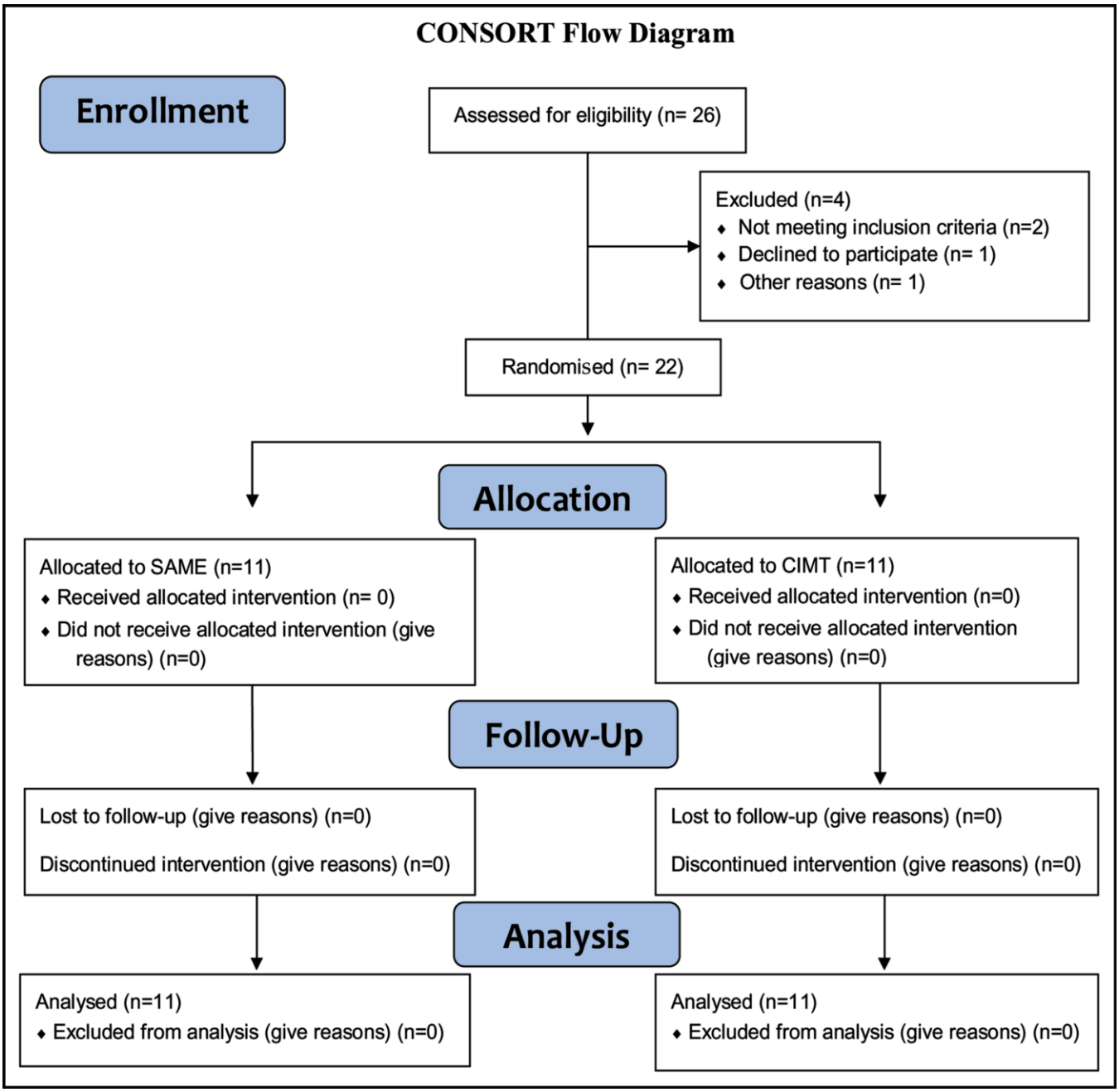

Figure: Consolidated standards for reporting of trials (CONSORT) diagram.

Table-3: Intra-group analysis of the CIMT group.

Variable	Pre-Intervention Mean±SD	Post-Intervention Mean±SD	p-value
Wolf Motor			
Functional Ability Scale	37.00±9.03	48.45±8.08	0.001
Performance Time	29.27±3.72	23.54±4.23	0.001
ARAT	23.18±6.96	39.00±6.54	0.001

CIMT: Constraint induced movement therapy, SD: Standard deviation, WMFT: Wolf motor function test. ARAT: Action research arm test.

16(53.3%) had right hemiplegic side. According to the MRS level of disability, 13(66.3%) had a score of 3 and 9(33.7%) had a score of 2.

Intergroup comparisons showed non-significant differences (p>0.05) (Table-1). Intragroup comparisons showed significant progress in both SAME (Table-2) and CIMT (Table-3) groups.

Discussion

The aim of the study was to compare the effects of two

techniques, SAME therapy and routine CIMT. This study had a significant result in the improvement of the upper limb functions at post intervention, however after treatment SAME and CIMT groups did not have significant differences in terms of outcome, and both were found to be equally effective. Recent studies on paretic upper extremity, although undersized and not sufficiently controlled, have indicated that these therapies may be promising tools to promote motor recovery, mobility, muscle strength, dexterity, and functionality after stroke. Kim et al. reported that both the protocols can be used to reduce body impairment in stroke survivors.[15]

Bilateral task-oriented exercises activate the ipsilesional primary motor area (M1), supplementary motor area (SMA), and primary sensory cortex (S1), and enhances the interhemispheric and interhemispheric connectivity within the sensorimotor network and the cortical motor system.[16,17] It has modulatory effects on brain compared to unilateral arm activity.[18,19] As a result, functional improvement is mediated, and healthcare professionals have claimed that both therapies directly affect the brain and activate the functions of brain in a positive manner.[20] Thus, selection of the therapy can be done on the basis of patients' priority because they chose therapy according to their capacity and nature.[21]

The current study has its limitations in the shape of a relatively small sample size, as it was a pilot study and the fact that it did not use imaging techniques that might have demonstrated brain reorganisation post-therapy. Large-scale RCTs are recommended.

Conclusion

SAME and CIMT were found to have similarly positive effects on upper limb functions among chronic stroke patients.

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Conflict of Interest: None.

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