

Role of Modified Constraint-Induced Movement Therapy to Improve Upper Limb Function after Stroke

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Abstract

A quasi-experimental study was conducted at Department of Physiotherapy; Gono Bishwabidyalay over a period of 12 weeks among 30 patients to see the effectivity of constraint induced movement therapy to improve upper limb function. The pre and post test values were assessed for function in group A and the standard deviation was 1.43, 1.57 and 1.26 respectively and the 't' values calculated for function by paired 't' test was 17.13, 16.10 and 18.67 respectively and it was more than table value 2.15. Again the pre and post-test values were assessed for function in group B and the standard deviation was 1.03, 1.35 and 0.67 respectively and the 't' values calculated for function by paired 't' test was 12.39, 14.32 and 9.97 respectively and it was more than the table value 2.15. The standard deviation for function in group A and group B was 1.25, 1.46 and 1.01 respectively and the 't' values was calculated by unpaired 't' test was 3.31, 2.24 and 6.07 respectively. The 't' values calculated was more than the table value 2.05. The paired 't' test values shows that both constraint induced movement therapy and task traditional treatments are effective in improve upper limb function in chronic stroke patients. The unpaired 't' test values shows that there is a significant difference between the two groups to improve upper limb function in chronic stroke patients. It is concluded that the constraint induced movement therapy can be effective to improve upper limb function.

Keywords: Modified Constraint-Induced Movement Therapy; Upper limb function

Introduction

A stroke, or Cerebrovascular accident (CVA), is the rapid loss of brain function(s) due to disturbance in the blood supply to the brain. This can be due to ischemia (lack of blood flow) caused by blockage (thrombosis, arterial embolism), or a hemorrhage [1]. Cerebrovascular diseases [2-4] predominate in the middle and late years of life. They can prove fatal or can cause considerable neurologic disability. A population-based case-control study of 1250 stroke deaths in rural Bangladesh present that Risk of stroke death have significantly increased with hypertension, diabetes mellitus betel consumption when adjusted for age and sex [5,6] propose that the explanation for high rates of stroke in Bangladeshis lies in their heavier burden of some established risk factors, their socioeconomic deprivation, and some novel risk factors that are yet to be characterized. Pending deeper understanding of the causes, doctors should be aware of the high risk of stroke and stroke fatality in Bangladeshis even in the absence of raised blood pressure. There is a high modifiable burden of risk factors for adult stroke deaths in rural Bangladesh, most notably including hypertension [7]. In Bangladesh Stroke constitute 8.9% of the hospital admissions among those aged 30 or above [8]. The morbidity and mortality from cerebrovascular diseases has been diminishing in recent years but still poses a large threat to health of human race in terms of functional disability. Following a cerebrovascular accident any spontaneous recovery of upper limb function that occurs is generally limited to the after three months. However, there is a consensus that current rehabilitation techniques are less effective in improving muscle strength and function of upper extremity. After this period

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motor recovery had been reported to be enhanced beyond that attained by conventional therapy, by such rehabilitation techniques including integrated approach over task oriented activity. Most of the middle and older age people impact cerebrovascular accident. Because stroke can lead to sensory, motor, cognitive, perceptual and language dysfunction. To prevent this impairment need appropriate physiotherapy rehabilitation techniques. Through this study, I would like to fixed out the effects of constraint-induced movement therapy versus traditional rehabilitation in patients with upper-extremity dysfunction after stroke.

Methodology

This was quasi-experimental study. The entitled study was conducted at Department of Physiotherapy, Gono Bishwabidyalay, Mirzanagar, Savar Cantonment, Dhaka and Gono Shashthaya Samaj Vittik Medical College, Gono Shashthaya Nagor Hospital & Various sub centers of GK. The study was conducted over a period of 12 weeks.

Inclusion criteria

Patients with all types of CVA, Patients with after six months of CVA, Patients with both right and left hemiplegia, Patients in the age of 30-60 years both sexes, Patients have some cognitive and language inabilities to understand and difficulties to follow instructions, Patients with spasticity and Patients with chronic stroke

Exclusion criteria

Patients with stable deformities of the upper limb, Patients with unable to do the isometric contractions of the muscle, Patients with shoulder hand syndrome, Patients with visual and auditory impairment, Patients with dislocation of the shoulder, Patients with fractures in the upper extremity, Patients with mental retardation, epilepsy etc, Subjects with other than stroke and Patients with sensory impairment.

All the hemiplegic subjects fulfilling the selecting criteria were the population of the study. The patients were selected by convenient sampling technique. A convenient sample of 30 stroke patients were taken into the study who were assigned to Group A (15 patients, men n = 10 (Rt hemiplegic n = 3, Lt hemiplegic n = 7), Woman n = 5, (Rt hemiplegic n = 2, Left hemiplegic n = 3) and Group B (15 patients, the same criteria selection in the group A). The subjects (both group A & group B) were informed to take part in the study. After that the clinical evaluation of upper extremity function was measured by voluntary control test of upper extremity and fugl-meyer functional test and berg balanced scale respectively. This pre-test score was entered in the chart. Both group of patients were treated daily on an outpatient basis.

Materials used in the study

- a. Fugl meyer scale (Upper limb function).
- b. Voluntary control testing.
- c. Action research arm test.
- d. Balance Board.
- e. Swiss Ball.

Traditional Rehabilitation

It included neuro recovery & neuroplasticity, robotic & training device, splinting, casting, and ROM, modalities, etc. Splinting and bracing prevent contracture and skin breakdown. Resting Arm Splint with isotonic glove was used to control swelling. Thermal stimulation, electrical E-stimulation vital stim, deep throat E- stimulation were used. Mostly used parameters were hot compression, massage etc.

Study group	Voluntary control testing			Fugl Meyer Assessment			Action Research Arm Test		
	Mean		Mean Deviation	Mean		Mean Deviation	Mean		Mean Deviation
Group A	Pre	Post	5.53	Pre	Post	6.07	Pre	Post	4.87
	21.80	27.33		25.93	32		16	20.86	
Group B	20.13	24.13	4.00	25.33	30.73	5.40	17.27	19.87	2.60

Table 1: Mean and mean difference values for function in Group A and Group B.

Study group	Standard deviation		
	Voluntary control testing	Fugle Meyer Scale	Action Research Arm Test
Group A	1.43	1.57	1.26
Group B	1.03	1.35	0.67

Table 2: Standard deviation values for function in group A and Group B.

Study group	Calculated paired 't' values			Table values	Significant or Not
	Voluntary control testing	Fugl Meyer Test	Action Research Arm Test		
Group A	17.13	16.10	18.67	2.15	Significant
Group B	12.39	14.32	9.97	2.15	Significant

Table 3: Paired 't' test values for function in Group A and Group B.

Study group	Calculated unpaired 't' values					Table value	Significant or not	
	'S' value	Voluntary Control Testing	'S' value	Fugle Meyer Test	'S' value			
Comparison of Group A and Group B	1.25	3.31	1.46	2.24	1.01	6.07	2.05	Significant

Table 4: Unpaired 't' test values for function in group A and Group B.

Result and Discussion

The pre and post test values were assessed for function in group A and the standard deviation was 1.43, 1.57 and 1.26 respectively, and the 't' values calculated for function by paired 't' test was 17.13, 16.10 and 18.67 respectively and it was more than table value 2.15 for 5% level of significance at 14 degree of freedom. Again the pre and post-test values were assessed for function in group B and the standard deviation was 1.03, 1.35 and 0.67 respectively and the 't' values calculated for function by paired 't' test was 12.39, 14.32 and 9.97 respectively and it was more than the table value 2.15 for 5% level of significance at 14 degree of freedom. The standard deviation for function in group A and group B was 1.25, 1.46 and 1.01 respectively and the 't' values was calculated by unpaired 't' test was 3.31, 2.24 and 6.07 respectively. The 't' values calculated was more than the table value 2.05 for 5% level of significance at 28 degree of freedom. The paired 't' test values shows that both constraint induced movement therapy and task traditional treatments are effective in improve upper limb function in chronic stroke patients. The unpaired 't' test values shows that there is a significant difference between the two groups to improve upper limb function in chronic stroke patients. This study was to prove constraint induced movement therapy is more effective when compared with traditional rehabilitation to improve upper limb function in chronic stroke patients. The traditional rehabilitations are widely used, although there have been only a few controlled studies of their efficiency. All of these previous studies have been in chronic CVA and the results have been contradictory. Wolf SL, Winstein CJ, Miller JP, Taub E suggest that a 2-week program of

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constraint-induced movement therapy (CIMT) for patients more than 1 year after stroke who maintain some hand and wrist movement can improve upper extremity function that persists for at least 1 year [9]. To compare the effects of a 2-week multisite program of CIMT vs usual and customary care on improvement in upper extremity function among patients who had a first stroke within the previous 3 to 9 months among patients who had a stroke within the previous 3 to 9 months, CIMT produced statistically significant and clinically relevant improvements in arm motor function that persisted for at least 1 year. George H and Kraft MD showed that rehabilitation of electrical stimulation resulted in significant improvement in upper limb motor function and reduction of spasticity in patients with chronic hemiplegic [10]. An evidence-based analysis showed significant difference was found in primary outcome of arm motor function measured with the Action Research Arm Test in favor of CIMT compared with usual care delivered with the same intensity and duration. Significant differences were also found in three of the five secondary outcome measures including Arm Motor Impairment and Perceived Motor Function Amount of Use and Quality of Use [11]. A systematic review and meta-analysis showed that constraint-induced movement therapy and modified constraint-induced movement therapy proved to be effective on affected hand mobility and to some extent self-care on the World Health Organization's International Classification of Functioning, Disability and Health activity and participation component, but further studies are needed to find out the optimal treatment protocols for constraint-induced movement therapy [12]. Small sample size, short duration and not been extended to above to 60 years of age of the patients. The study could be concluded that the constraint induced movement therapy is effective to improve upper limb function.

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