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Original Article

A STUDY ON THE EFFECTIVENESS OF BOBATH APPROACH VERSUS CONSTRAINT INDUCED MOVEMENT THERAPY (CIMT) TO IMPROVE THE ARM MOTOR FUNCTION AND THE HAND DEXTERITY FUNCTION IN POST STROKE PATIENTS

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ABSTRACT

Objective: To compare the effects of the Bobath Therapy and Constraint-Induced Movement Therapy on arm motor function and hand dexterity function among stroke patients with a high level of function on the affected side.

Materials and Methods: Study has conducted at the Outpatient physiotherapy department of a stroke unit. With a total of 30 patients were conveniently recruited and then randomized to Bobath Concept group and constraint-induced movement therapy group. Intervention included were the Bobath Concept group was treated for 1.5 hours per day during 5 consecutive weekdays for 4 weeks whereas the constraint-induced movement therapy group received training for 2 hours per day during 5 consecutive weekdays for 3 weeks. Outcome measures by the Wolf Motor Function Test, and Jebsen Taylor Hand Function Test.

Results: The two groups were found to be homogeneous based on demographic variables and baseline measurements. There were no significant differences in Wolf Motor Function Test at post test (p = 0.861) and at follow up (p = 0.395). There is a significant improvement in JTHFT in both the groups with sight better improvement in group B (except writing components post test p=0.752and checkers at post test p=0.197 and follow up p=0.167)) as compared to Group A.

Conclusions: Bobath therapy and the Constraint-induced movement therapy have similar efficiencies in improving arm motor function in the paretic arm among stroke patients with a high level of function. Constraint-induced movement therapy seems to be slightly more efficient than the Bobath Concept in improving hand dexterity function.

KEYWORDS: Stroke, Rehabilitation, Learned Nonuse, Bobath Therapy, Upper Extremity, Arm, Dexterity Function, Gross Arm Motor Functions.

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INTRODUCTION

Stroke is the rapidly developing loss of brain function(s) due to disturbance in the blood supply to the brain. After coronary heart disease (CHD) and cancer of all types, stroke is the third commonest cause of death worldwide. During the last decade, the age-adjusted prevalence rate of stroke was between 250-350/100,000.

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Upper extremity paresis is a leading cause of functional disability after a stroke as it causes difficulty in everyday life. Up to 85% of patients show an initial deficit in the arm. While recovery of arm function is poor in a significant number of patients, leg function has proven to be less of a problem. Paralysis of an arm after a stroke makes arm movements, such as, reaching, grasping, and manipulating of objects difficult. There are several approaches to physiotherapy treatment after stroke. However, there is a lack of evidence to support any specific physiotherapy treatment approach.

The Bobath concept was first developed in the 1950s and is the most commonly used approach for stroke rehabilitation. The treatment emphasis was on the therapist normalizing tone and facilitating automatic and volitional movement through specific handling of key points (pelvis, trunk, shoulder girdles, and hands and feet). The theory underpinning the Bobath Concept considers an approach to motor control that encompasses not only important key features about the individual but also how they interact in the world around them. Therapy based on the Bobath Concept aims to regain motor control and function of the hemiparetic side after stroke without promoting compensation.

Constraint Induced Movement Therapy (CIMT) has gained increasing popularity as a treatment mode for restoring function of upper extremity in patients with stroke. Constraint-Induced Movement Therapy (CIMT) is a type of treatment for hemiparetic stroke patients in which the patient is strongly encouraged to use the affected arm. Constraint-induced movement therapy continues to hold great promise as a neurorehabilitation approach that can be classified as a functional retraining procedure.

There is no evidence of any one physiotherapy treatment approach being more effective than any other treatment approach for the recovery of disability or impairment after a stroke [2].

In a way to know a significant outcome in single independently performed therapies, the purpose of the study is to compare the effectiveness of Bobath approach over constraint induced movement therapy and vice versa for upper extremity functions in sub- acute stroke patients.

METERIALS AND METHODS

The patients were informed about the whole procedure, treatment merits and demerits. A written consent was obtained from them for their voluntary participation in the study. They were then randomly divided into Group A and Group B of 15 subjects each. The study included a sample of 30 subjects who were diagnosed with CVA and are in sub-acute phase of stroke. The stroke patients referred to Physiocare, physiotherapy department of Garden city college of Physiotherapy and to the physiotherapy department of ITI Hospital, Bangalore were screened for inclusion.

Inclusion Criteria: Subjects included in the study were those who met the following inclusion criteria: Subjects with diagnosis of cereberovascular accident, Sub-Acute Stage of stroke, above 40 years of age of either sex, who can achieve minimal motor criteria (higher and lower functioning) [3] and sufficient stability to walk when the less affected arm is immobilized.

Exclusion Criteria: Subjects diagnosed with cerebellar stroke [4], with Perceptual disorders, orthopedic disorders involving upper extremity, Epilepsy and uncontrolled medical illness.

Procedure: At the entry to the study, patient characteristics such as age, sex and side affected, were documented. Subjects in Group A were given verbal and written instructions and a demonstration by the Physiotherapist on exercises under Bobath intervention. The emphasis was given on the control of muscle tone and recruitment of arm activity in functional situations with various positions (lying, sitting, standing, walking, both with and without objects and during unilateral and bilateral tasks) [5]. Another principle of Bobath Approach was also been given emphasis was Sensorimotor Integration, which basically means 'sensory guide muscle activation' in which the patient was assisted to stabilize a proximal body

segment or joint in the correct orientation before and/or during active movement of a distal effector [6].

Subjects in Group B also received verbal instruction and a demonstration by the Physiotherapist on the tasks to be completed. The training sessions included Repetitive Task Practice and Shaping Programme. Repetitive Task practice included practice of a full functional task that had multiple steps of completion. The subjects practiced functional activities (such as drinking, eating, washing face) over defined time periods while giving them information and encouragement about how they may have done the task better. In shaping the task goal was achieved in small steps of successive approximation (part of the task) [7]. The arm and hand exercises consisted of task practice, such as moving objects from one place to another, pouring water into mugs from a jar, putting objects through a slot, typing, fine motor practice, such as fastening nuts on bolts, putting pegs in a board, buttoning and unbuttoning, writing; muscle strength training through pulling weights; muscle stretching; general activity training, such as laying the table, cleaning a window, washing the dishes, office work, handicrafts, playing games and indoor sports [8].

The less involved extremity was restraint with a help of an arm sling and the involved extremity was given CIMT. All subjects in Group A were treated on daily basis of 1.5 hours per day, 5 days a week for 4 week (Total 30 hour of duration) [9]. All subjects in Group-B were treated on daily basis of 2 hours, 5 days per week for 3 week (Total 30 hours of duration). Evaluation of upper extremity arm motor function and hand dexterity function was performed before and immediately after the completion of treatment and at follow up after two weeks of post treatment by using Wolf Motor Function Test(WMFT), Jebsen Taylor Hand Function Test (JTHFT).

Tools Used for the study were assessment Forms, reflex hammer, Goniometer, arm sling, JTHFT Kit, WMFT Kit.

RESULTS AND TABLES

Table 1: Age Distribution.

Age in years	Group A		Group B	
	No	%	No	%
40-50 years	9	60	9	60
50-60 years	4	26.7	5	33.3
>60 years	2	13.3	1	6.7
Total	15	100	15	100

The above table shows the age distribution among the 30 subjects.

Table 2: Gender Distribution.

Gender	Group A		Group B	
	No	%	No	%
Male	9	60	13	86.7
Female	6	40	2	13.3
Total	15	100	15	100

The above table shows the gender distribution among 30 subjects.

Table 3: The inter group comparison of Jebsen Taylor Hand Function Test.

Variables	Group A	Group B	P value
Writing			
Pre-test	56.57±22.37	65.25±50.15	0.558
Post-test	53.29±21.29	50.00±32.91	0.752
Follow up	53.29±21.29	37.13±23.21	0.058+
Cards turning			
Pre-test	6.27±0.48	6.43±1.08	0.629
Post-test	6.21±0.54	5.21±0.49	<0.001**
Follow up	6.07±0.65	4.69±0.65	<0.001**
Small Common objects			
Pre-test	7.74±0.64	7.33±0.76	0.124
Post-test	7.43±0.51	6.56±0.88	0.003**
Follow up	7.27±0.48	6.03±0.78	<0.001**
Simulated feeding			
Pre-test	9.17±0.90	9.40±2.24	0.724
Post-test	8.56±1.25	7.38±0.67	0.003**
Follow up	8.49±1.3	6.38±1.62	0.001**
Checkers			
Pre-test	4.96±1.02	5.36±1.79	0.47
Post-test	4.84±1.03	4.33±1.08	0.197
Follow up	4.72±1.06	4.15±1.13	0.167
Large light objects			
Pre-test	4.12±0.32	4.58±1.22	0.181
Post-test	3.94±0.41	3.62±0.51	0.075+
Follow up	3.68±0.61	3.31±0.35	0.046*
Large heavy objects			
Pre-test	4.63±0.62	4.92±1.23	0.432
Post-test	4.32±0.64	3.58±0.47	0.001**
Follow up	4.11±0.4	3.24±0.24	<0.001**

Result shows significant improvement in both the groups with slightly better improvement in Group B at post test (p=0.003 and at follow up (p=0.001).

Fig. 1: Showing the Compression between Group A and Group B for card turning.

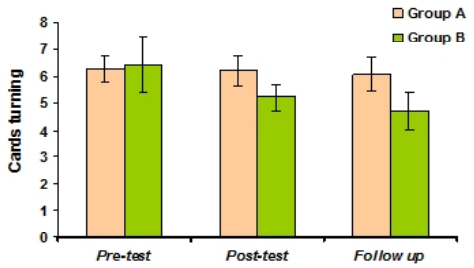
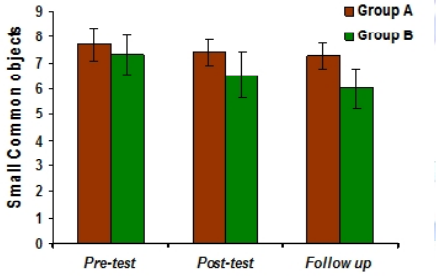
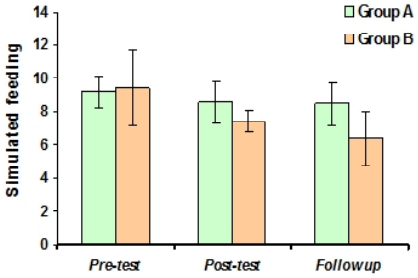


Fig. 2: Showing the Compression between Group A and Group B for small common objects.



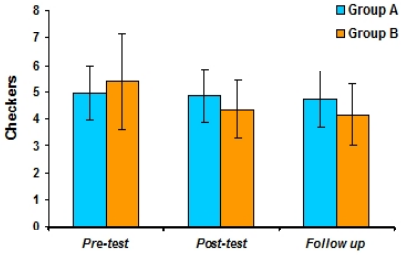
Result shows significant improvement in both the groups with slightly better improvement in Group B at post test (p=0.003 and at follow up (p=0.001).

Fig. 3: Showing the Compression between Group A and Group B for simulated feeding.



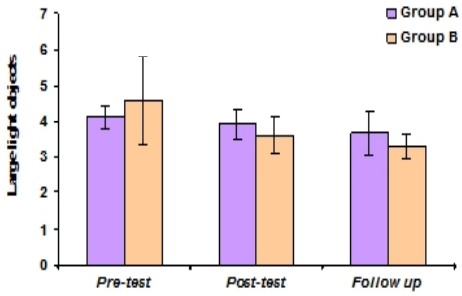
Result shows improvement in both the groups but no statically significant difference is seen.

Fig. 4: Showing the Compression between Group A and Group B for checkers.



Result shows slight improvement at post test measurement (p=0.075) and moderate improvement at follow up (p= 0.046) in Group B.

Fig. 5: Showing the Compression between Group A and Group B for large light objects.



Result shows improvement in both the groups with slight better improvement in Group B (p=0.001).

Table 3(b): The intra group comparison of Jebsen Taylor Hand Function Test.

Variables	Difference		P value	
	Group A	Group B	Group A	Group B
Writing				
Pre-Post test	3.29	15.25	0.031*	0.005**
Post-test-Follow up	-	12.88		0.005**
Cards turning				
Pre-Post test	0.06	1.21	0.165	<0.001**
Post-test-Follow up	0.14	0.52	0.040*	0.008**
Small Common objects				
Pre-Post test	0.31	0.77	0.006**	0.001**
Post-test-Follow up	0.16	0.54	0.127	0.002**
Simulated feeding				
Pre-Post test	0.61	2.03	0.019*	0.005**
Post-test-Follow up	0.07	1	0.165	0.028*
Checkers				
Pre-Post test	0.13	1.04	0.030*	0.037*
Post-test-Follow up	0.11	0.18	0.048*	0.009**
Large light objects				
Pre-Post test	0.19	0.96	0.017*	<0.001**
Post-test-Follow up	0.26	0.31	0.040*	<0.001**
Large heavy objects				
Pre-Post test	0.31	1.34	<0.001**	<0.001**
Post-test-Follow up	0.21	0.33	0.165	0.002**

Table 3(c): The intra group comparison of Jebsen Taylor Hand Function Test.

Variables	Difference		P value	
	Group A	Group B	Group A	Group B
Writing				
Pre-Post test	3.29	15.25	0.031*	0.005**
Post-test-Follow up	-	12.88		0.005**
Cards turning				
Pre-Post test	0.06	1.21	0.165	<0.001**
Post-test-Follow up	0.14	0.52	0.040*	0.008**
Small Common objects				
Pre-Post test	0.31	0.77	0.006**	0.001**
Post-test-Follow up	0.16	0.54	0.127	0.002**
Simulated feeding				
Pre-Post test	0.61	2.03	0.019*	0.005**
Post-test-Follow up	0.07	1	0.165	0.028*
Checkers				
Pre-Post test	0.13	1.04	0.030*	0.037*
Post-test-Follow up	0.11	0.18	0.048*	0.009**
Large light objects				
Pre-Post test	0.19	0.96	0.017*	<0.001**
Post-test-Follow up	0.26	0.31	0.040*	<0.001**
Large heavy objects				
Pre-Post test	0.31	1.34	<0.001**	<0.001**
Post-test-Follow up	0.21	0.33	0.165	0.002**

Table 4(a): The inter group comparison of Wolf Motor Function Test.

Wolf Motor Function Test Score	Group A	Group B	P value
Pre-test	38.71±2.27	35.13±6.68	0.066+
Post-test	45.14±3.3	45.50±6.91	0.861
Follow up	47.71±3.45	50.25±10.47	0.395

The above table shows the comparison of Wolf Motor Function Test Score in two groups of patients studied. The result shows no statistical difference in both the Groups with post test measurement (p= 0.861) and at follow up (p=0.395).

Table 4(b): The intra group difference of Wolf Motor Function Test.

Wolf Motor Function Test Score	Difference		P value	
	Group A	Group B	Group A	Group B
Pre test-Follow up	-9	-15.13	<0.001**	<0.001**
Post-test-Follow up	-2.57	-4.75	<0.001**	<0.001**

The above table shows within the group difference of Wolf Motor Function Test Score in two groups of patients studied. The result shows highly significant improvement in both the groups (p=<0.001**).

DISCUSSION

The primary objective of the study was to evaluate whether CIMT or BBT has a positive effect on the upper extremity functions including gross motor as well as fine motor functions.

On evaluation of the Group A, significant improvement is observed in both the groups. The WMFT has shown significant improvement at pre-post test score (p=0.001) and as well at post-follow up test score (0.001). Thus, there is a significant improvement seen in Bobath intervention in improving arm motor function as demonstrated by WMFT scores. The JTHFT has also shows improvement, although writing had improved slightly at pre-post test comparison (p=0.031). Cards turning had moderate improvement at post test-follow up comparison (p=0.040). Small common objects improved significantly at pre-post test comparison (p=0.006). Simulated feeding had a moderate improvement at pre-port test comparison (p=0.019). Checkers had shown moderate improvement at pre-post test comparison (p=0.030) as well as post-follow up test comparison (p=0.048). Large light objects also showed moderate improvement in pre-post test comparison (p=0.017) and as well in post-follow up test comparison (p=-.040). Large heavy objects significant improvement at pre-post test comparison (p=0.001).

On evaluation of the Group B also, significant improvement is observed in both the groups. The WMFT has shown significant improvement at pre-post test score (p=0.001) and as well at post-follow up test score (p-0.001). The JTHFT also shows significant improvement in its subcomponents. Writing shows significant improvement at pre-post test comparison and as well as at post-follow up comparison (p=0.005). Cards turning also show significant improvement at pre-post comparison (p<0.001) and post-follow up comparison (p=0.008). Small common objects shows significant improvement at pre-post comparison (p=0.001) and as well in post-follow up comparison (p=0.002). Simulated feeding shows significant improvement at pre-post comparison (p=0.005) and moderate significance at post-follow up comparison (p=0.028).

Checkers shows moderate significance at pre-post comparison while there is significant improvement at post-follow up comparison (p=0.009). Large light objects shows significant improvement both at pre-post comparison as well as post-follow up comparison (p=0.001). Large heavy objects also shows significant improvement at pre-post comparison (p<0.001) and also at post-follow up comparison (p=0.002). Thus, from the individual statistical analysis it can be infer that both the interventions (BBT AND CIMT) are individually effective in improving arm motor function and hand dexterity functions of paretic upper extremity. The few statistically significant differences could all be attributed to chance.

On comparing both the groups the pretesting to post testing and to follow up periods, participants of both groups exhibited marked gains in WMFT scores (preintervention mean 38.71±2.27and 35.13±6.68; post intervention mean 45.14±3.3 and 45.50±6.91; follow up mean 47.71±3.45 and 50.25±10.47), hence there is no significant difference is found in both the groups in terms of arm motor function.

An unexpected finding was that participants exhibited no statistically significant improvement in writing (JTHFT) and grip strength (WMFT) responses. This may be concluded on the basis of hand dominance, as the subjects were not recruited on the specifications of dominance.

The study speculated that the retention difference between BBT and CIMT is attributable to CIMT's emphasis on movement and to the exceptional opportunities that CIMT provides to encourage extremity use. Since non differences between approaches were found in this study, it is possible that other factors such as dose and timing are more important than the treatment given. For the present, results indicate that physiotherapists may choose to use either BBT or CIMT treatment as neither was found to be more effective than the other but CIMT can be a better option to be chosen for hand rehabilitation.

The hand dominance had not been taken into consideration which could have lead to unexpected result as were reported with writing and grip strength measurement. Moreover hand dominance has an important role in perception and execution of an activity, therefore, a study with hand dominancy and the required specific intervention can be a further process.

Painful overuse syndromes, the risk of falls, and the frustration engendered by focusing on a weak and clumsy limb have been cited as potential problems. In this study, only one patient reported exacerbation of shoulder pain, 3 weeks after the end of the intervention period.

CONCLUSION

Constraint-induced movement therapy and the Bobath Concept have similar efficiencies in improving functional ability and quality of movement in the paretic arm among stroke patients with a high level of function. Constraint-induced movement therapy seems to be slightly more efficient than the Bobath Concept in improving the dexterity function.

Therefore the study did not show that one approach was more effective than the other in the treatment of upper extremity in sub acute stroke patients but CIMT promises better results for hand rehabilitation.

Conflicts of interest: None

REFERENCES

[1]. Tapas K. Banerjee and Shaymal K. Das. Epidemiology of stroke in India. Neurology Asia 2006; 11 : 1 – 4

[2]. Hilde M. Feys, Willy J. De W, Beat E. S, Gail A. Cox Steck, Ruth S, Luc E. V, Koen D. Putman and Gustaaf A,Van H. Effect of a Therapeutic Intervention for the Hemiplegic Upper Limb in the Acute Phase After Stroke : A Single-Blind, Randomized, Controlled Multicenter Trial. Stroke 1998, 29:785-792.

[3]. Wolf S, Winstein CJ, Miller JP, Taub E, Uswatte G, Morris D, Giuliani C, Light KE, Nochlos-Larsen D. Effect of Constraint-Induced Movement Therapy on Upper Extremity Function 3 to 9 Months After Stroke; The EXCITE Randomized Clinical Trial. JAMA. 2006; 296 (17): 2095-2105.

[4]. MWW Myint, KK Yu, PL Kng, CP Wong, KC Chow, CK Li, CP Wong. Use of constraint-induced movement therapy in Chinese stroke patients during the sub-acute period. Hong Kong Med J 2008;14(5):40-2.

[5]. Lin KC, Wu CY, Liu JS, Chen YT, Hsu CJ. Constraint-induced therapy versus dose-matched control intervention to improve motor ability, basic/ extended daily functions, and quality of life in stroke. Neurorehabil Neural Repair. 2009 Feb;23(2):160-5.

[6]. Takashi Murayama, Kenji Numata, Takahiro Ki, Tomonari T, Masaru O[4], Nobuo O, Mihoko K, Jun T.Changes in the brain activation balance in motor-related areas after constraint-induced movement therapy; a longitudinal fMRI study. 2011; 25(11):1047-1057.

[7]. Wu CY, Fu T, Lin KC, Feng CT, Hsieh KP, Yu HW, Lin CH, Hsieh CJ, Ota H. Assessing the streamlined Wolf motor function test as an outcome measure for stroke rehabilitation. Neurorehabil Neural Repair. 2011 Feb;25(2):194-9.

[8]. AnnetteS, Freivoget S.. Intensive training in chronic upper limb hemiparesis does not increase spasticity or synergies. Neurology. 2010 Dec 14;63 (11):2176-7.

[9]. Ray-Yau Wang, Chen-Yin Chen. Efficacy of Bobath versus orthopaedic approach on impairment and function at different motor recovery stages after stroke: a randomized controlled study. Clinical Rehabilitation. 2005; 19: 155-164.

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