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ORIGINAL ARTICLE

A COMPARATIVE STUDY OF HAND-ARM BIMANUAL INTENSIVE THERAPY (HABIT) VERSUS MOTOR IMAGERY TECHNIQUE ON UPPERLIMB FUNCTION IN POST STROKE PATIENTS	Search engine: **www.ijmaes.org**

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ABSTRACT

Background of the study: Stroke (Cerebro vascular accident) CVA is the sudden loss of neurological function caused by an interruption of the blood flow to the brain. The disabling effects of stroke depend on the affected areas of the brain. Post-stroke rehabilitation is a patient-centered, goal-driven process that attempts to maximize the functional independence of patients. The purpose of the study is to show the effectiveness of Hand-arm bimanual intensive therapy and Motor imagery technique to improve upper limb function in post stroke patients. The aim of the study to compare the effectiveness of Hand-arm bimanual intensive therapy (HABIT) and Motor imagery technique to improve upper limb function in post stroke subjects. **Methods:** this is a quasi Experimental study with 30 patients who met inclusion criteria were to be recruited for the study by purposive random sampling method; they were divided into two groups. Group A and Group B consists of 15 subjects .Subjects in Group A receives Hand-Arm Bimanual Intensive Therapy. Group B receives Motor Imagery. **Result:** Group A stroke patients included in the study completed the sessions of Hand-arm bimanual intensive therapy were re-evaluated at the five-month follow-up. The two-tailed P value is less than 0.0001, by conventional basis; which shows that distinction is exceedingly statistically significant. **Conclusion:** The study concluded that Hand-arm bimanual intensive therapy was effective treatment for improving upper limb function stroke patients.

Keywords: Hand-arm bimanual intensive therapy, Motor imagery, Action research arm test, Fugl-meyer assessment

INTRODUCTION

Stroke is a severe medical condition that occurs when the blood inflow to a particular part of the brain is intruded either by a blockage or bleeding in the brain. Stroke is one of the major disabling health problems in developing countries like India. The average periodic prevalence rate of stroke in India presently is 145 per 100,000 populations which is advanced than the western nations. The Global Burden of conditions, Injuries and Risk Factors Study(GBD) 2017 discovered that stroke was one of the third- leading cause of death and disability[1].One of the most affected region are the upper extremities(UE) of the human body, movement problems in these region limit the quality of life by limiting the capability to perform activities of daily living(ADL)[2].

Ischemic stroke is the most common type, affecting about 80% of individuals with stroke and results when a clot blocks or impairs blood inflow, depriving the brain of essential oxygen and nutrients. Hemorrhagic stroke occurs when blood vessels rupture, and causes leakage of blood in or around the brain. Clinically, a variety of focal deficits are possible including changes in the level of consciousness and impairments of sensory, motor, cognitive, perceptual and language functions[3].

Motor deficits are characterized by palsy (hemiplegia) or weakness (hemiparesis), generally on the side of the body opposite the side of the lesion. The location and extent of brain injury, the amount of collateral blood flow, and early acute care management determine the severity of neurological deficits in an individual case. Impairments may restore spontaneously as brain swelling subsides generally within 3 weeks[4].Residual neurological impairments are those that persist longer than 3weeks and may lead to lasting disability.

Stroke is the fourth leading cause of death and the leading cause of long- term disability among grown-ups in the United States. Of cases with stroke, hemorrhagic stroke accounts for the largest number of deaths, with mortality rates of 37% to 38% at 1 month, whereas ischemic stroke have a mortality rate of only 8% to 12% at 1 month. Survival rates are dramatically lessened by increased age, hypertension, heart disease and diabetes. Loss of consciousness at stroke onset, lesion size, patient severe hemiplegia, multiple neurological deficits and history of former stroke are also important predictors of mortality[5].

Atherosclerosis is a major contributory factor in cerebrovascular disease. It is characterized by plaque formation with an accumulation of lipids, fibrin, complex carbohydrates and calcium deposits on arterial walls that leads to progressive narrowing of blood vessels[6]. Interruption of blood flow by atherosclerotic plaques occurs at certain sites of predilection. These generally include bifurcations, constrictions, dilations or angulation of arteries. The most common sites for lesions to occur are at the origin of the common carotid artery or at its transition into the middle cerebral artery, at the main bifurcation of the middle cerebral artery, and at the junction of the vertebral arteries with the basilar artery.

Risk factors for stroke are hypertension, heart disease, disorders of heart rhythm and diabetes mellitus. Following a CVA, upper motor neuron paralysis is generally limited to one side of the body, affecting the musculature

of the trunk and limbs on the affected side.This paralysis is characterized by increased muscle tone known as hypertonicity or spasticity and the loss of coordination or control of smooth rhythmic movement[7].

Hand- Arm Bimanual Intensive Therapy (HABIT) is a recent intervention developed at Columbia University that targets individualities with cerebral palsy. HABIT is not only grounded on ordinary bilateral coupling or mirror movements, but also an asymmetrical movements of both hands, which uses the principles of motor learning and neuroplasticity[8].The HABIT approach also includes increasing complexity of the functional activities that necessitate the use of both hands and repetitions to achieve functional goals[9].

Motor Imagery (MI) is a technique where the movement is imagined and mentally rehearsed without voluntary movement. It is a dynamic state during when the representation of a specific motor action is internally activated without any motor output[10]. Therefore, the current study is aimed to probe the effectiveness of Hand- Arm Bimanual Intensive Therapy (HABIT) and Motor Imagery (MI) on improving upperlimb function in stroke

METHODOLOGY

The study was conducted at JKKMMRF College of Physiotherapy-Outpatient Department. 30 samples were selected by convenient sampling techniques which consist of both male and female each group consists of 15 persons.

GROUP A-Hand arm bimanual intensive therapy

GROUP B-Motor imagery

Paramaeters: Action research arm test, Fugl-meyer assessment

Inclusion criteria:

- Onset of stroke <6 months
- Age: 40-60 years
- Ischemic stroke
- Brunnstrom stage of motor recovery of 3 to 5
- Intact sensation and protective reaction

Exclusion criteria:

- Uncontrolled medical problems that can alter vital signs
- Hearing problems
- Global aphasia
- Cognitive impairment
- Cardiac arrhythmias
- Chronic stroke

Procedure and Protocols

Group A (Hand-Arm bimanual Intensive therapy)

- The subjects in Group A received Hand-arm bimanual intensive therapy (HABIT).These activites are as follows, Threading a needle
- Wrapping up gifts
- Fastening the zipper of a jacket
- Buttoning and unbuttoning
- Sharpening a pencil
- Taking the cap of a bottle
- Squeezing toothpaste on toothbrush
- Nuts and bolts
- Cutting paper with scissors

Dosage: 60 minutes-3days for 5months

GROUP B

Group B Motor Imagery

The subjects in Group-B was treated with functional-activity-based motor imagery with mental practice inducting physical practice with video previewed consisting of 5 tasks.

The motor tasks given were, picking up a tea cup with a handle and taking it to the mouth, and then returning the cup to its initial position, turning pages of a book, reaching the top of the head to comb, picking up a mobile phone to receive the call and holding a of a pen to write.

RESULT

Group	ARAT	Mean	Standard deviation	Paired t-test
Group A	Pre-test	10.33	0.70	46.28
	Post- test	42.87		
Group B	Pre-test	9.87	0.47	15.32
	Post- test	17.07		

Table 1: Descriptive statistics for Action research arm test– Group A and Group B

Descriptive statistic for Action research arm test in Group A shows that paired't' test values of pre Vs post-test values of Group A was 46.28 at 0.0001 level which was greater than tabulated 't' values (2.13). Group B shows that paired't' test values of pre Vs post-test values of Group B was 15.32 at 0.0001 level which was greater than tabulated 't' values (2.13). This showed alike there is significant difference between pre Vs post test results of Group A and Group B for ARAT. This exposed that there was significant improvement in post – test mean values in response to ARAT in Group A and Group B.

RESULT

Action Research Mean Test	Mean	Mean difference	Standard deviation	Unpaired t- test
Group A	42.87	25.80	1.17	21.92
Group B	17.07			

Table 2: Action Research Arm Test (Post Test Analysis)

The above table shows the post-test analysis result in ARAT for Group A and B. The mean value of Group A is 42.87 which was greater than Group B value of 17.07 and the unpaired't' test value was 21.92 at 0.0001 level, which was greater than tabulated 't' value (2.15). It showed statistical significance difference between mean values of Group A and B.
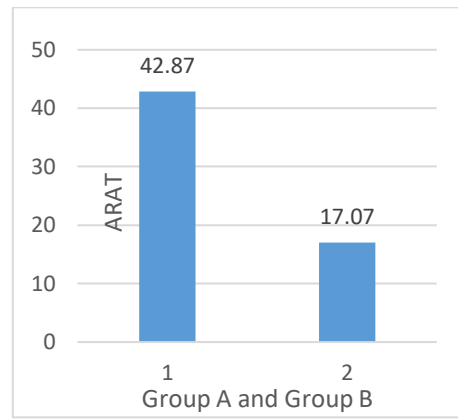
Graph- 1: Mean difference of ARAT between Group A and Group B

RESULT

‖Group	FMA	Mean	Standard deviation	Paired t- test
Group A	Pre-test Post- test	16.13 42.33	0.50	51.47
Group B	Pre-test Post- test	22.60 27.73	0.25	20.07

Table 3: Descriptive statistics for Fugl-meyer assessment- Group A and Group B

Descriptive statistic for Fugl-meyer assessment in Group A shows that the paired't' test values of pre Vs post-test values of Group A was 51.47 at 0.0001 level which was greater than tabulated 't' values (2.13). Group B shows that the paired 't' test values of pre Vs post-test values of Group B was 20.07 at 0.0001 level which was greater than tabulated 't' values (2.13). This showed that there was significant difference between pre Vs post test results in Group A and Group B. There was a significant improvement in post – test mean value in response to Fugl-meyer assessment.

RESULT

Fuglmeyer assessment	Mean	Mean difference	Standard deviation	Unpaired t- test
Group A	42.33	15.00	1.01	14.76
Group B	27.33			

Table 4: Fugl-Meyer Assessment (Post Test Analysis)

The above table shows the post-test analysis result in FMA for Group A and B. The mean value of Group A is 42.33 which was greater than Group B value of 27.33 and the unpaired 't' test value was 14.76 at 0.0001 level, which was greater than tabulated 't' value (2.15). It showed statistical significance difference between mean values of Group A and B.
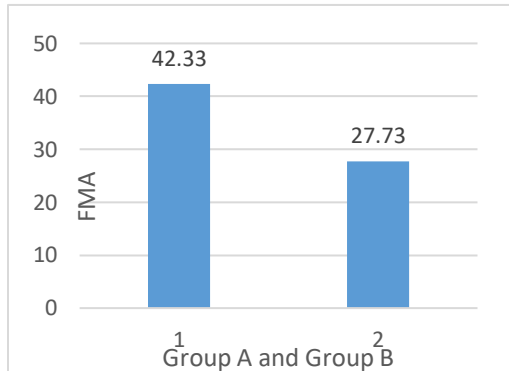
Graph-2: Mean difference of FMA between Group A and Group B

DISCUSSION

The purpose of the study was to determine the effectiveness of Hand-arm bimanual intensive therapy and Motor imagery to improve upperlimb function in stroke patients. The Action research arm test and Fuglmeyer assessment was taken as the parameter to assess the upperlimb function. The study sample comprised of 30 patients of age group 40-60 years grouped as A and B. In each group 15 subjects were participated. Group A with HABIT and Group B with MI. The result of the statistical analysis brings out the following for consideration.

The result showed that there was statistical significant difference between Group A and B. The Stroke patients who were treated with Hand-arm bimanual intensive therapy had shown good improvement in upper limb function.

In the analysis and interpretation of Action Research Arm Test in Group A and Group B for 15 patients in each group

The unpaired t test value of ARAT in Group A and B post- test analysis was 21.92 which were greater than the tabulated t value 2.15.

In the analysis and interpretation of Fugl Meyer Assessment in Group A and Group B for 15 patients in each group

The unpaired t test value of FMA in Group A and B post- test analysis was 14.76 which were greater than the tabulated t value 2.15.

The result showed that there was statistical significant difference between Group A and B. The Post-Stroke patients who were treated with Hand-arm bimanual intensive therapy had shown good improvement in upper limb function.

Meheroz H Rabadi et.al, 2006 Conducted a study to assess the relative responsiveness of 2 commonly used upper extremity motor scales, the action research arm test and Fugl Meyer assessment to evaluate recovery of upper extremity function after an acute stroke in patients undergoing inpatient rehabilitation. The study includes 104 consecutive admissions (43 men, 61 women) to a rehabilitation unit after acute stroke. They concluded that both the FMA motor score and the ARAT were equally sensitive to change during inpatient acute rehabilitation and could be routinely

used to measure recovery of upper extremity function[11].

Shan, Shradha, et al. 2022 conducted a case study to explore the effect of hand-arm bimanual intensive therapy (HABIT) on the recovery of upper limb function in young stroke patients. A 30 year old male patient was admitted with right-sided hemiplegia and sensory aphasia. The patient was engaged in HABIT for 2 hours per day for 3 months. They concluded that HABIT appears to be efficacious in improving upperlimb function in young stroke[12].

Magdalena letswaart , Maris et, al. 2011They conducted a randomized controlled trial to evaluate the therapeutic benefit of mental practice with motor imagery in stroke patients with persistent upper limb motor weakness. The randomized controlled sequential cohort study included 121 stroke patients with a residual upper limb weakness. The result suggests that mental practice with motor imagery does not enhance motor recovery in patients with early post stroke[13].

CONCLUSION

The study which was conducted for 5 months period of intervention showed that Group A of those who received Hand-arm bimanual intensive therapy resulted in improvement on upper limb function than Group B who received Motor imagery.

The study concluded that Hand-arm bimanual intensive therapy was effective treatment for improving upper limb function stroke patients.

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