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A COMPARATIVE STUDY BETWEEN ACTION OBSERVATION THERAPY VERSUS MIRROR THERAPY TO IMPROVE UPPER LIMBFUNCTION IN STROKE

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ABSTRACT

Background and Purpose: Stroke is the most common disabling motor deficit especially in upper limb function. Stroke is a medical condition characterized by a sudden disturbance of cerebral blood Flow resulting in neurological deficits due to brain tissue injury. Objective of the study is to compare the effectiveness of action observation therapy versus mirror therapy to improve upper limb stroke. This Study has a quasi experimental design involving two groups with pre - test and post - test measurements. **Methods:** A sample of 30 patients within the age group 40-55years with stroke patients was selected based on the inclusion and exclusion criteria and they were divided into two groups. Group A (n=15) and Group B (n=15). The subjects in group A was treated with Action Observation Therapy (AOT) and the subjects in group B was treated with Mirror Therapy (MT). Modified Ashworth scale and Fugl – Meyer Assessment were used as outcome measures. Each patient was given a physiotherapy program for 12 weeks duration. The pre and post treatment values were measured before and after 12 weeks for comparison. **Results**: The results of this study showed that there was significant improvement in both groups. The subject who participated in experimental Group A had shown good improvement motor function than the Group B. **Conclusion:** Based on the result, this study concluded that Action Observation Therapy (AOT) was effective in reduction of spasticity and improvement of motor function than in mirror therapy for upper limb in stroke patient.

Keywords: Action Observation therapy (AOT), Mirror therapy, Modified Ashworth Scale (MAS), Fugl Meyer Assessment (FMA).

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INTRODUCTION

Stroke is a medical condition characterized by a sudden disturbance of cerebral blood Flow resulting in neurological deficits due to brain tissue injury. Fundamentally, it involves the abrupt loss of oxygen and nutrients to a localized brain region, leading to the death of neurons and other brain cell within minutes if untreated. The term cerebrovascular accidents (CVA) are used interchangeably with stroke to refer to cerebrovascular conditions that accompany either ischemic or hemorrhagic lesions[1].

Ischemic stroke; It arises from an obstruction within a cerebral artery that diminishes or blocks blood supply to the brain tissue. Common causes of ischemic stroke include thrombotic occlusion, where clot formation results from atherosclerotic plaque rupture in cerebral vessel, and embolic occlusion, where clots or particulate matter from remote areas of the body circulate through the bloodstream and become lodged in the arteries within the brain[2].Hemorrhagic stroke: This condition arises when blood vessel in the brain bursts, causing bleeding either within the brain tissue itself or into the spaces surrounding the brain, such as the subarachnoid space. A primary contributing factor is the weakening of blood vessel walls as a result of prolonged hypertension. Ruptured aneurysms, arteriovenous malformations, trauma, and anticoagulant therapy.

The primary impairments manifested by stroke include sensory deficits, visual defects, speech disorder, altered muscle tone, synergy patterns, pain, weakness, swallowing difficulties, pressure sores, balance disorder, bladder and bowel dysfunction, perceptual dysfunction. The secondary impairments manifested by stroke include skin breakdown, shoulder dislocation, deep vein thrombosis, complex regional pain syndrome etc[3].,

Risk factors for stroke include advanced age, hypertension, previous stroke or transient ischemic attack (TIA), diabetes, high cholesterol, cigarette smoking, atrial fibrillation and pregnancy. Non modifiable risk factors for stroke comprise age, sex, ethnicity, and familial history[4].

MATERIALS & METHODS

The study was conducted at JKKMMRF Institutions, Outpatient department in JKKMMRF College of Physiotherapy, under supervision of concerned authority. Samples of 30 patients within the age group of 40-55 years with stroke patients were randomly divided into two groups. A total number of 30 subjects were selected by random sampling method after due consideration to inclusion criteria. They were divided into two groups. Group A and Group B with 15 subjects in each group. Group A received Action Observation Therapy (AOT) in addition to selected physiotherapy programme. Group B received Mirror therapy in addition to selected physiotherapy programme for a total duration of 12 weeks, 5 days per week, 1 session per day. The parameter is used for this study was Modified Ashworth scale and Fugl meyer assessment. Both males and females are included in this study.

Inclusion Criteria: Cerebral ischemic stroke, Age Between 40 to 55 years old, Unilateral stroke, Both men and women, Motor deficit of upper limb grade>3.

Exclusion Criteria: Cardiovascular problem, Hemorrhagic stroke, Major medical problem, Bilateral stroke, Impaired dementia, Severe visual deficits, Participants with psychological or psychosomatic disorders.

Procedure:

30 patients with Stroke were selected based on the Inclusion and Exclusion criteria and they were be divided into 2 Groups, Group A and Group B. A pre test and post test was conducted for the Group A and Group B on modified Ashworth scale (MAS) and fugl-meyer Assessment (FMA) for stroke. First group (Group A) was treated with of Action observation therapy to improve upper limb function in stroke. Second group (Group B) was treated with Mirror therapy to improve upper limb function in stroke.

Intervention for Group A

Group A was treated with Action observation therapy to improve upper limb function in stroke.

Procedure: They are two phase of action observation therapy. Observation phase and Execution phase

Treatment duration:

Observation Phase: 5 to 10 minutes.
Execution Phase: 15 to 20 minutes.
Total Treatment Duration – 30 minutes

Exercises: Pour water from a bottle into a glass, Button a shirt (or) zip up a jacket, Pick up coins& place them into a jar, Touch different colored targets.

Intervention for Group B:
Group B was treated with mirror therapy to improve upper limb function in stroke.

Procedure:

During phase 1(AROM Exercises)
During Phase 2(reaching movement or one object manipulation task)
During phase 3(functional task)

1) AROM Exercises:

Elbow:
Supination/ pronation, Flexion/ Extension, Wrist-flexion/ extension, Finger- Flexion/ Extension
Reaching Movement:
Opening the bottles cap, Picking up small objects, reaching to touch a target, reaching to grasp a cup, reaching to pick a ball, reaching to placed a block

2) Functional Task:
Brushing hair, Wiping table, Opening & closing a drawer, Lifting a cup to drink, Typing on a key board, Locking/ unlocking a door with a key.

Duration of treatment: 30 minutes per sessions.

Statistical Analysis

GROUP	MAS	Mean	Standard Deviation	Paired 't'value
Group A	Pretest	3.07	0.80	11.2250
	Post test	1.87	0.83	
Group B	Pretest	2.93	0.80	12.4746
	Post test	1.80	0.77	

Table 1: Descriptive statistics for Modified Ashworth Scale-Group A and Group B

Descriptive statistic for Modified Ashworth Scale in Group A showsthat paired‘t’ test values of pre vs post-test values of Group A was 11.2250 at 0.05%levelwhich was greaterthan tabulated‘t’values2.14.GroupB showsthat paired ‘t’ test values of pre vs post-test values of Group B was 12.4746 at 0.05% level which was greater than tabulated ‘t’ values 2.14. This showed like there in significant difference between pre vs post-test results of Group A and Group Bfor MAS. This exposed that there was significant improvement in post-test mean values in response to MAS in Group A and Group B

MAS	Mean	Mean Difference	Standard Deviation	UnPaired ‘t’value
GroupA	1.20	0.07	0.41	0.4752
GroupB	1.13		0.35	

Table 2: MAS (Post Test Analysis)

The Unpaired ‘t’-value of 0.4752 was greater than the tabulated Unpaired ‘t’- value of 2.4 which showed that there was statistically significant difference at 0.0001 level between Group A and Group B.The pre vs post-test mean of Group A was 1.20 and the pre vs post test mean of Group B was 1.13 and the mean difference of Group A and Group B was 0.07 which showed that there was significant improvement in MAS score for Group A than Group B.

GROUPS	FMA	Mean	Standard Deviation	Paired ‘t’value
GroupA	Pretest	24.13	4.50	23.3292
	Post test	47.07	4.32	
GroupB	Pretest	20.93	4.82	11.4612
	Post test	32.20	4.48	

Table 3: Descriptive statistics for FMA-Group A and Group B

Descriptive statistic for Fugl – Meyer Assessment in Group A shows that paired ‘t’ test values of pre vs post-test values of Group A was 23.3292 at 0.05% level which was greater than tabulated ‘t’ values 2.14. Group B shows that paired ‘t’ test values of pre vs post-test values of Group B was 11.4612 at 0.05% level which was greater than tabulated ‘t’ values 2.14. This showed like there in significant difference between pre vs post test results of Group A and Group B for FMA. This exposed that there was significant improvement in post - test mean values in response to FMA in Group A and Group B.

FMA	Mean	Mean Difference	Standard Deviation	Unpaired 't'value
Group A	22.93	11.60	3.81	8.1998
Group B	11.33		3.94	

Table 4: Fugl – Meyer Assessment (Post test Analysis)

The Unpaired 't'-value of 8.1998 was greater than the tabulated paired 't'- value of 2.14 which showed that there was statistically significant difference at 0.0001 level betweenGroup A and Group B. The pre vs post testmean of Group A was 22.93 and the pre vs post-test mean of Group B was 11.33 and the mean difference of Group A and Group B was 11.60 which showed that there was significant improvement in FMAfor Group A than Group B.

RESULT

The study which was concluded for period of 12 weeks intervention, based on the statistical analysis the results of this study showed that there was significant improvement in both groups. The result also showed that the subjects who participated in experimental Group A had shown good improvement of motor function than in Group B.

DISCUSSION

The aim of this study was to compare the effect of Action observation Therapy versus Mirror therapy to improve upper limb in stroke. A total number of 30 subjects with the effect of Action observation Therapy versus Mirror therapy were selected by Quasi Sampling method after considering the inclusion and exclusion criteria. The information contents were obtained from individually.

Modified Ashworth Scale and Fugl Meyer Scale were taken as the parameter. Pre test data were collected for group A and group B for stroke patients were subjected to effect of Action observation Therapy versus Mirror therapy or a period of 12 weeks. The paired 't' test was used to compare the pre vs post test result of group A and group B separately. The unpaired't' test was to compare the mean difference of group A and group B.

If the analysis and interpretation of Modified Ashworth Scale, the unpaired 't' value was 0.475 was greater than the tabulated value which would showed that there was statistically significant difference at 0.0001 level between mean difference of group A and group B. The mean value of group A was 1.20, group B was 1.13, mean difference 0.07, shows that there was a significant increase in group A and compared to group B in responsible to intervention.

If the analysis and interpretation of the Fugl Meyer Assessment, the unpaired 't' value was 8.1998, it was greater than the tabulated value which would showed that there was statistically significant difference at 0.0001 level between mean difference of group A and group B. The mean value of group A was 22.93, the mean value of group B was 11.33, and

mean difference 11.60 shows that there was a significant improve in group A, compared to group B in responsible to intervention.

A study conducted by Jin- Young – Park el. Al., on response to mirror therapy in post stroke to improving the upper limb function. The results mirror therapy was improve in upper limb function and daily activity in terms of fugl - meyer assessment[5]. A study conducted by Eun – Cho Park (2014) el. Al., on response to action observation therapy in post stroke to improve static balance and gait function.

The result of the study supports the presents study where the participants increase the balance[6]. A study conducted by Vijayaraj (2017) el. Al., was assessed the effects of mirror therapy and tactile stimulation on chronic stroke. The result of the study indicated that mirror therapy was improving upper limb function in terms of action research arm test[7].

Physiological effects of action observation therapy:

This stimulates the mirror neuron system (MNS), a group of brain areas that become active not only during the execution of a movement but also when watching someone else perform the same action. Studies show that observing goal-directed movements stimulates the premotor cortex, inferior parietal lobule, and superior temporal sulcus, which are involved in movement planning and execution[8]. Cortical Reorganization in AOT promotes reorganization in the sensorimotor cortex, enhancing recovery of motor function. Facilitation of Motor Learning - AOT enhances motor learning through mental rehearsal, which strengthens neural pathways associated with motor control[9].

Physiological effects of mirror therapy:

Visual Stimulation and Motor Cortex Activation: MT provides visual feedback that activates the motor cortex even when the paretic limb is not moving. Enhanced Proprioceptive and Tactile Feedback - The visual illusion may increase somatosensory input, further promoting sensorimotor integration[10].

CONCLUSION

Based on statistical analysis the results of this study showed that there was significant improvements in both Groups. The result also showed that the subject who participated in Action observation therapy had shown good improvement than the mirror therapy. The study concluded that action observation therapy versus mirror therapy was effective treatment for improvement of upper limb function on stroke.

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