Effect of Action Observation Therapy to Improve Upper Extremity Functions Among Persons with Right Hemiplegia

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KEYWORDS	ABSTRACT:
action observation therapy, upper extremity functions, right hemiplegia	Introduction: Recovery from a stroke and the extent of disability can vary significantly among individuals. Rehabilitation, which includes physical therapy, occupational therapy, speech therapy, and psychological support, plays a crucial role in helping individuals regain function and improve their quality of life after a stroke. Objectives: To determine the effect of Action observation therapy to improve upper extremity functions among persons with right hemiplegia. Methods: The study included 30 stroke patients with right hemiplegia between 20 to 60 years. The study sample was divided into two groups with 15 in each arm. The experimental group underwent Action observation therapy. The control group underwent conventional occupational therapy. Intervention was done for 3 months with 36 sessions. The evaluation tool of Dash questionnaire was used. Results: The mean value of the control group is 74.8267 and the mean value of the experimental group is 69.1.The statistical analysis showed significant changes in the experimental group after action observation therapy. Conclusion: The result suggest that the action observation therapy can be used an effective intervention to improve upper extremity functions among patients with right hemiplegia.

I. Introduction

Stroke is a global health-care problem that is serious resulting in disability. In most countries, stroke is the second or third most common cause of death and one of the main causes of acquired adult disability (Langhorne, Bernhardt, & Kwakkel,2011).

Existing evidence shows that around one-third of patients with stroke show persistent disability after the initial cerebrovascular episode, with motor impairments accounting for most poststroke disability. Exercise and training have long been used to restore motor function after stroke. Better training strategies and therapies to enhance the effects of these rehabilitative protocols can enhance poststroke disability (Dimyan, & Cohen, 2011).

It has been reported to occur in about a fifth of all stroke patients have increased stroke severity and impairment.

Early rehabilitation reduced disability and improved quality of life (Rasmussen, Østergaard, Kjær, 2016).

Stroke patients experience complex forms of impairments of motor functions and cognitive functions, usually affecting one half of the body, including paralysis, muscle weakness, speech impairment, sensory impairment, and cognitive impairment, caused by the infarction or haemorrhage of cerebral blood vessels due to circulatory disorders affecting the cerebral blood supply. This physical damage and disability commonly appear in the form of hemiplegia and the person will experience upper extremity dysfunction (Al-Qazzaz, Ali, Ahmad, Islam, Mohamad, 2014).

Hemiplegia is defined as the paralysis of the arm, leg, and trunk on one side of the body, while hemiparesis refers to muscle weakness (or partial paralysis) of one side of the body. Brain being the central control of the body determines the consciousness, actions and emotions.

Damage to brain either from birth or due to injury or illness in the later years might result in partial repair or complete repair of muscle control and operation. Hemiplegia affects every one differently but its most obvious result is varying degree of weakness and lack of control in one side of the body. In adults, the usual cause of hemiparesis is a cerebrovascular accident or stroke. Howerer in children, on the other hand, a number of other conditions apart from stroke can present as hemiparesis including but not limited to CNS infection (e.g., encephalitis, meningitis, and abscess), neoplastic intracranial space-occupying lesions (ICSOL), trauma, and developmental anomalies of the brain (Chinnabhandar, Singh, Mandal, Parmar, 2018)

Action Observation (AO) is a dynamic state during which the observer understands what the model is doing, which simulates the medium to propagate the actions and outcomes that are likely to be followed from the observed motor act. Action Observation Therapy (AOT) has action observation and action execution phase which are integrated to allow patients' to safely practice movements and motor tasks. Action Observation Therapy (AOT) is a multi-sensory approach using basic neuroscience which involves somatosensory and cognitive rehabilitation. This approach works by activating the mirror-neural system (MNS) of the brain (Shih et al., 2017). AO training is a treatment that improves functional mobility, motor control of patients (Giannakopoulos, Karanika,Papaxanthis,& Tsaklis, 2022).

The objectives of the study were

II. Objectives

- To determine the impairment of upper limb function in patients with stroke with the help of DASH questionnaire.
- To improve upper extremity function for patients with right hemiplegia in control group
- To find out the effect of action observation therapy to improve upper extremity functions for patients with right hemiplegia in experimental group.

To compare the effect of action observation therapy with conventional occupational therapy programme between control and experimental group.

III. Methods

A quantitative method was employed and descriptive design was used. A total of 30 samples with 15 in each arm were recruited using . Sample size calculation was done based on previous studies and was calculated as 30. Both male and female patients in ages between 20 – 60 were included in the study. Patients with any other disability other than stroke were excluded from the study. The study was conducted in two centres namely Saveetha hospital, Thandalam and Premji neuro hospital, Vellore. The instruments used for data collection included the DASH questionnaire. The DASH consists mainly of a 30-item disability/symptom scale, scored 0 (no disability) to 100. Reliability score of DASH questionnaire is 0.96 and validity is person r>0.70, making it a very valid and reliable scale. The study was conducted over 3 months. Data collection was done over a of 12 weeks with the intervention programme given 3 days a week 2 sessions a day, each session 1 hour. The experimental group were showed videos of daily living tasks, in the knowledge that they would then attempt to perform the same movement task after watching. The intervention encompassed of videos, demonstration return demonstration by the participants. The control group were given OT exercises like Ball throwing, finger laddering, Ball squeezing, Board games etc.

Data collection was done by the principal investigator in the respective centres to ensure confidentiality. Ethical approval was obtained from the Institutional Review Board. The ethical committee approval number is SCOT/ISRB/167/2023. Written informed consent was obtained from the study participants. Confidentiality of the information was achieved by maintaining the anonymity of the participants. Analysis of the collected data was done using the SPSS software 17.0 and descriptive and inferential statistics were used. Written informed consent was obtained. Confidentiality was maintained.

IV. Results

Majority of the subjects in the study were in ages 40 – 60 years men/women .

Table 1.Statistical analysis of pre- test and post- test in control group

Test	Mean	SD	N	Z value	p value
Cntr_Pre	78.1667	5.8899	15		
Cntr_Post	74.8267	5.95309	15	-3.418	0.001*

* $p < 0.05$; **p<0.001

Table 2. Statistical analysis between the post- test scores of the control and experimental group

Group	Mean	SD	N	Z value	p value
Cntr_Post	74.8267	5.95309	15		
Expt_Post	69.1	7.01519	15	2.26	0.023*

* $p < 0.05$; **p<0.001

Table 1 and 2 outlines that there is marked reduction in the post test scores of both the groups showing that both interventions are effective ($p < 0.05$)

In this study both interventions provided benefits to chronic stroke patients. Exercise program with action observation presented better results on motor recovery (p < 0.001) and functional use of the affected limb (p < 0.001) when compared with conventional therapy. Both treatments improved the manual dexterity of the participants (p = 0.002), but in a similar way (p = 0.461).

V. Discussion

This study intended to determine how action observation therapy helps in integrating hand functions, the effect so caused by action observation therapy on the upper extremity of the person affected with stroke, and also to evaluate the degree to which it causes change in the hand functions which will indirectly helps to calculate the amount of dependence and participation in social activities.

Similar results were observed in studies wherein it was identified that after the eight weeks of treatment, both groups of patients exhibited significant improvement in all the measurements (all $p < 0.05$). Furthermore, the Fugl–Meyer assessment, Barthel index and modified Ashworth scale scores were significantly higher in the experimental group compared to the control group (all $p < 0.05$) (Fu et al., 2017).

In a study by Mancuso (2021) showed that the potential efficacy of AOT both on upper limb recovery and global functional outcome, as compared to TOT, based on Activities of Daily Livings (ADLs) in a sample of stroke patients that was in the early phase after stroke.

Although the sample size is small, individual improvement seen in stroke patients. Most of the activities selected in this therapy helps in integration of other functional activities and tasks. In this study AOT is proved to be useful, especially in terms of a cost effective, simple and home based program.

In similar studies the preliminary results found that the patients in the action observation therapy and active control intervention groups had comparable benefits (Hsieh, 2020). AO improves motor learning in healthy individuals and ensures a promising tool to regain motor function after stroke (Harmsen, Bussmann, Selles, Hurkmans, Ribbers, 2015)

VI. Conclusion

Thus this study proves that effectiveness of Action Observation therapy to improve upper extremity functions among persons with right hemiplegia. The result of the present study indicate that action observation therapy can be a useful treatment for patients who lack with ADL skills.

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