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EFFECTIVENESS OF VISUAL REGARDS IN IMPROVING REACH AND GRASP AMONG ACUTE HEMI PARESIS-A PILOT STUDY

D.Suresh

Dean, Occupational Therapy,Trichy SRM Medical College Hospital & Research Centre,Samayapuram, Trichy, India

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ABSTRACT

Stroke is one of the major causes of human morbidity and mortality. The purpose of the study is to find out the effectiveness of Occupational Therapy interventions with visual regards to improving the reach and grasp. A sample of seven patients with acute hemiparesis was selected for this study. The investigator developed intervention protocol and was given to patients for 30 minutes per session,3 days / week for 6 weeks.Pretest and posttest score were recorded. There is significant difference in the pretest and the posttest scores among acute hemiparesis Thus findings of the study suggest that improving the visual regards will improve the reach and grasp skills in acute hemiparesis patients.

KEYWORDS: *Hemi Paresis, Effectiveness of Visual*

INTRODUCTION

Stroke is one of the major causes of human morbidity and mortality. In 2013 approximately 6.9 million people had an ischemic stroke and 3.4 million people had a haemorrhagic stroke.[1] Between 1990 and 2010 the number of strokes which occurred each year decreased by approximately 10 % in the developed world and increased by 10 % in the developing world.[11] In 2013, stroke was the second most frequent cause of death after coronary artery disease, accounting for 6.4 million deaths (12 % of the total).[2] About 3.3 million deaths resulted from ischemic stroke while 3.2 million deaths resulted from haemorrhagic stroke.[2]

Upper-limb impairments affect daily living in a wide variety of injury and illness conditions. Interventions aimed at facilitating upper-limb function focus on improving functional performance, improving quality of movement, and reducing compensatory motion. Most authors have advocated using motions that simulate a common movement activity of daily living (ADL) task, such as drinking, combing hair or reaching hand to head, jar opening, removing a parking token, or reaching and placing a ball [7].

In reviewing the typical activities of our day, it becomes apparent that upper-extremity function is the basis for the fine motor skills important to activities such as brushing, feeding, dressing and grooming etc.

During activities of daily living, the upper limbs are involved in numerous and complex tasks in relationship with objects, persons and the environment. The visuo-motor integration of prehension has been analysed and divided into sub-components, such as reaching, grasping, manipulation, arm transport with or without handling objects, and release [8].

We need to understand the basic requirements of reach, grasp and manipulation. It will provide the structure for clinical management of upper extremity dysfunction in patient with neurological impairment.

Studies of eye, head and trunk movements using synchronised methods are needed. We tested the feasibility of a method to synchronise and evaluate eye, head and trunk movement patterns. The method tested was feasible, and it could be used to evaluate movement patterns of subjects with injuries [9].

In 2008, Sveistrup H.et al. did study on Head, arm and trunk coordination during reaching in children. And it concluded that for reaching tasks, however, there are no data about the development and maturation of coordination between the head and trunk movements and when the pattern of coordination is considered mature head; arm and trunk coordination has an effect on reaching in children [11].

The reach is in part an egocentric act directed toward the extrinsic (location) features of objects while the grasp is in part an allocentric act directed toward the intrinsic (shape and size) features of objects. Phylogenetic, developmental, and behavioural evidence suggest that the reach and the grasp evolved separately under somatosensory control and were subsequently coordinated with visual control in the primate lineage [10].

One of the key elements of reach and grasp is visual regards which requires the coordination of eye, head, and trunk movements and is essential in guiding movement of the hand. But there is no previous studies done to prove the effect of visual regards based interventions on improving reach and grasp in stroke patients.

MATERIAL AND METHODS

Research Design

This is a Quantitative, quasi experimental study

Sample

This study was conducted on acute hemiparesis patients in and around Chennai. As a pilot study four (n=7) patient with age group 40 to 65 were selected through Non- probability convenient sampling. The subjects for this study recruited from SRM hospital, and Community based rehabilitation setup

Variable

- **Independent Variables**: Visual regards (eye- hand coordination).
- **Dependent Variables:** Reach, Grasp
- **Extraneous Variable**: Gender & Age, Hand dominance, Socioeconomicstatus, ethnicity, education.

SCREENING CRITERIA

Inclusion Criteria

- Both male and female of late adulthood.
- Modified Brunnstrom stages (3-4).
- Absence of cognitive impairment, MoCA score ≥26.
- Patient who doesn't have unilateral neglect.
- Patients with normal or corrected hearing.
- Both right and left acute hemi paresis.

Exclusion Criteria

- Patient who has problem in visual acuity.
- Any associated neurological conditions (like; Parkinsonism, etc.).
- Any history of previous injury to hand.
- Visual field problems like nystagmus.
- Patients who is taking psychiatry medication(s)

INSTRUMENT USED

Screening Tool

- Screening tool based on visual regard

Visual Regards

- Intact
- Impaired
- Unable
- Modified Brunnstrom stages to find out voluntary motor control
- Montreal Cognitive Assessment (MoCA) scale

Outcome Measurement Tools

- **Box and Block Test:** The Box and Block Test is a simple, low-cost, and efficient test of gross manual dexterity.

Procedure for Collection of Data

- The patientswith acute hemiparesis(age 40 -65) were recruited based upon the inclusion and exclusion criteria. The purpose of the study was explained to the subjects. Written consent form was obtained from each subject.
- Subjects selected from SRM medical college hospital and community rehabilitation setting.
- All the participants were administrated with visual regard screening tool, modified brunnstrom recovery stage (3-4), MoCA as screening tool.
- All participants were administrated individually pretest with the box and blocks test to evaluate reach and grasp.
- Developed intervention protocol and got validated from 4 experienced experts in the field of Neuro rehabilitation.
- 30 minute session,3 days/week for 6 weeks
- Intervention was given to improve visual regards(eye- hand- coordination) through feed forward and feed backward mechanism
- Posttest was administrated after six weeks to assess the effectiveness of reach and grasp through the box and block test.

Materials Used

Bucket, mop, glass, clip, cloth, screen, draw, box and block test, stop watch

DATA ANALYSIS

Descriptive statistical analysis to find out the baseline characteristics, like gender, age, etc. of the sample population.

Paired 't' test to determine the effectiveness of visual regard based treatment in improving reach and grasp between pretest and posttest group.

The data were analysed using the statistical package for the SPSS (version 22)

INTERVENTION PROTOCOL

Forward Reach

Above 90: Getting clothes from a hook

At 90: Reaching out for the glass of water

Below 90: Reaching to clean the floor with a mop

Abduction

Above 90: placing the screen aside

At 90: draw opening

Below 90: taking a bucket

Horizontal Abduction: Clipping clothes

Extension: Getting up from a chair

RESULTS AND DISCUSSIONS

Table 1 provides the information about the frequency distribution of general characteristics of the patients with the hemi paresis. There were 7 patients included in this study and out of 7 there was 4 males (57.1 %) and 3 females (42.9 %). The age group was categorized into 3 domains 4050, 5060, 6065. Patients' population was 42.9 % in 4050 and 28.6 in each 50-60 and 6065 age groups

Graph 1 shows the graphical representation of the percentage of age distribution and graph 2 shows the age group distribution of the population

Table 1

Variables	Category	Frequency	Percent
Age	40–50	3	42.9 %
	51–60	2	28.6 %
	60–65	2	28.6 %
Sex	Male	4	57.1 %
	Female	3	42.9 %
Religion	Christian	5	71.4 %
	Hindu	2	28.6 %
Education	Primary School Certificate	1	14.3 %
	Middle School Certificate	2	28.6 %
	High School Certificate	3	42.9 %
	Graduate or Post Graduate	1	14.3 %
Occupation	Unemployed	2	28.6 %
	Unskilled Worker	1	14.3 %
	Semi-Skilled Worker	2	28.6 %
	Clerical, Shop-Owner, Farmer	1	14.3 %
	Semi-Profession	1	14.3 %
Family Income	16020–32049	2	28.6 %
	12020–16019	2	28.6 %
	8010–12019	1	14.3 %
	4810–8009	2	28.6 %
Socio economic status	16–25 Middle Upper Middle	4	57.1 %
	11–15 Lower Middle	2	28.6 %
	5–10 Lower Upper Lower	1	14.3 %
Habits Hobbies	Alcoholic / Drug	1	14.3 %
	Watching TV	4	57.1 %
	Cooking	1	14.3 %
	Driving	1	14.3 %
Side Involved	Right	3	42.9 %
	Left	4	57.1 %
Other Medical Issues	Diabetes	2	28.6 %
	Hypertension	3	42.9 %
	Transient Ischemic Attack	2	28.6 %

The Objective of the Research was to Compare the Pretest and the Posttest Score of Box and Block Test

Table 2 Compares the Pretest and the Posttest scores of Box and BLOCKS test – There is a marked mean difference of 18.42 between the Pretest and the Posttest scores with a high statistically significant difference where p is 0.0001. The Figure 2 shows the graphical representation of the pre-test and post-test of the box and block test.

The researcher of this study stressed the importance of the newly modified reach to grasp protocol and its effectiveness of occupational therapy interventions with visual regards in improving reach and grasp among acute hemi paresis. Similarly in 2014 Whishawet al.did astudy on The Contribution of the Reach and the Grasp to Shaping Brain and Behavior and concluded that Phylogenetic, developmental, and behavioural evidence suggest that the reach and the grasp evolved separately under somatosensory control and were subsequently coordinated with visual control in the primate lineage. Accordingly, parallel pathways from visual cortex came to influence separate reach and grasp systems in parietofrontal cortex, and new descending pathways to the spinal cord came to assist in visually guided reaching. Neural processes related to the "where" of the reach and the "what" of the grasp have had a formative role in shaping cognition more generally.

In the present study, the researcher developed the modified protocol of reach to grasp from a study done on hemiplegic children and the base of the study was during activities of daily living, the upper limbs are involved in numerous and complex tasks in relationship with objects, persons and the environment. The visuo-motor integration of prehension has been analysed and divided into sub-components such as reaching, grasping, manipulation, arm transport with or without handling objects, and release based on this areas the modified reach to grasp protocol was formulated and applied.

The researcher found that repetition of the same task (blocked practice) helped the patients to remember better during the subsequent sessions. When clear instructions were given about the beginning and the end of the task (discrete tasks). Preparatory activities helped the researcher to build a rapport with the patients and for the better practice of the tasks.

Hence, the research hypothesis, proved that there will be a significant difference in the pretest and the posttest scores among acute hemiparesis has been accepted.

The Table 3 talks about the paired sample correlation and the correlation valued as 0.429 which is moderate positive correlation and there is no statistical correlation between pre and posttest at 95 % (P>0.05) and graph 4 shows the graphical representation of correlation.

Table 2: Comparison of Pre-Test and Posttest of Box and Blocks in the Experiment Group

		Mean	N	SD	Paired t Test	P Value	Mean difference	95 % CI	
Pair 1	Pretest	15.86	7	4.413	8.3276 df	0.0001 ***	18.429	Upper	Lower
	Posttest	34.29	7	6.184				23.844	13.013

IMPLICATION

The finding of the study demonstrates that the therapist could gain knowledge or give importance to visual regards based interventions to acute hemiparesis patients which can reduce the long term disability. The current study implies that improving visual regard based activities can improve functioning of the activities of daily living in acute hemiparetic patients. As we occupational therapist can imply this in our treatment for the patients with problems in activities of daily living. The occupational therapist may use various techniques to facilitate activities of daily living by concentrating on visual regards. Based on the outcome of the study, we will be able to concentrate on visual regards based activities to treat the acute hemiparetic patients who has problem in activities of daily living.

CONCLUSIONS

The purpose of the study is to find out the effectiveness of Occupational Therapy interventions with visual regards in improving the reach and grasp. A sample of seven patients with acute hemiparesis was selected for this study. There is a significant difference in the pretest and the posttest scores among acute hemiparesis. Thus finding of the study suggest that improving visual regards will improve the reach and grasp skills in acute hemiparesis patients.

LIMITATIONS AND RECOMMENDATIONS

Limitations

Like any other study, this study also has its own limitation left behind for the future reference to overcome as follows

- The sample size was small
- The demographic variables such as age, gender couldn't be matched between groups
- Due to the lack of patients availability, we can't generalize the results
- Only one experimental group, no control group

Recommendations

- The sample size was small and it was selected based on availability hence further studies can be done with larger population by using standard sampling
- The same type of study can be done in the other conditions
- The study can be done in the normal population to find out the relationship

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