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Effectiveness of Motor Relearning Programme on Sit to Stand Performance Among Right and Left Hemiparesis Patients

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ABSTRACT

OBJECTIVE: To compare the effectiveness of Motor Relearning Program (MRP) on sit to stand performance among right and left hemi paresis patients.

Study design: Quasi experimental study design with two groups pre-test and post test. Participants: A total of 16 male right and left hemi paretic patients in the age group of 45 to 65 years participated in the study. The participants recruited were diagnosed with middle cerebral artery lesion with duration less than 3 weeks and a score of 1 on the Motor Assessment Scale for sitting to standing up item. The patients who satisfied inclusion criteria were conveniently assigned into 2 groups. Group A- right hemiparesis and Group B- left hemi paresis.

Interventions: Motor Relearning Programme for sitting to standing for duration of 2 weeks (40 minutes/session, 5session/week, total 10 sessions). Outcome Measures: Measurements were taken using Sitting to standing functional item of Motor Assessment Scale (MAS) following 2 weeks of the training program.

Results: Statistical analysis was done using the 't' test, which showed a significant improvement in Motor Assessment Scale (MAS) for sitting to standing up item for both groups. But GROUP-A (Right hemi paresis) showed a more significant improvement than GROUP – B(Left hemi paresis) in Motor Assessment Scale (MAS) for sitting to standing up item.

Conclusions: The findings of this study suggest Motor Relearning Programme improves sit to stand performance. And there was a significant difference in sit to stand performance between right and left hemi paresis patients following 2 weeks of Motor Relearning Programme.

Keywords: Motor Relearning Programme, Sit to stand, Motor Assessment Scale, Hemi paresis.

INTRODUCTION

Stroke is defined as rapidly developing clinical signs of focal or global disturbance of cerebral blood function, with symptoms lasting for 24 hours or leading to death with no apparent cause other than that of vascular origin- WHO[1]. the ability to stand up and sit down is essential to an independent lifestyle. Standing up is a prerequisite for other functions such as over ground and stair walking which require the ability to get into standing position.[2]

Difficulty in standing from a chair is an indicator of balance deficits and likely to result in a fall. Inability to stand up is common early on following stroke and difficulty performing the action may continue beyond discharge, limiting independence and participation in everyday life. Inability to stand up independently predisposes the individual to further decreases in muscle strength and physical fitness, and to adaptive soft tissues changes.

Patients with stroke exhibited an asymmetric body weight distribution, with significantly more body weight on their sound side[3.] Difficulty in standing up is reported to be a common source of falls,[4] and the fall occur due to deficits in muscle strength and postural stability following stroke.

The ability to stand up and sit down are in themselves essential to independence. Sit to stand is in addition a prerequisite to the independent performance of other actions such as walking which require the ability to get into the standing position. There is some evidence that sit to stand is one of the demanding everyday tasks we perform regularly and lack of independence in this action has been reported to be one of the most likely factors associated with risk of institutionalization.

Laterality of motor control, laterality refers to tendency for the cerebral hemisphere to specialize in function. The dominance of the left hemisphere for speech and language in the majority of individuals and the dominance of right hemisphere for visuospatial orientation are well documented[5,6]. Recent evidence suggests that certain aspects of motor control may also demonstrate hemispheric dominance. Right sided brain lesions have been associated with motor impersistance or the inability to maintain a steady grip or posture[7]. Conversely motor deficits associated with left sided brain damage include difficulty in performing fast paced repetitive movements[8,9], and difficulty in sequencing movements[10].

However, the investigation of the influence of laterality of cerebral lesion on functional motor recovery in rehabilitation following CVAs has not been extensive or detailed. The purpose of the study is to examine difference between the functional abilities (sit to stand) with right and left hemiparesis patients and Motor Relearning Programme (MRP) is one of the approaches to enhance functional recovery after stroke[11,12] ,but there is lack of supporting literature on sit to stand performance between right and left hemiparesis patients using Motor Relearning Programme. So, there is need for the implementation of Motor Relearning Programme (MRP) and its influence on improving sit to stand performance among right and left hemiparesis patients.

MATERIALS & METHODS

They study was conducted with 16 hemiparesis patients who fulfilled the inclusion criteria were selected.

STUDY SETTING:

The quasi-experimental study was conducted from 2011 to 2013 in the department of Physical Medicine and Rehabilitation, Kovai medical centre and hospital, Coimbatore, Tamil Nadu, India.

PARTICIPANTS ELIGIBILITY

Inclusion: Right and Left Middle cerebral artery Ischemic stroke patients with mean age group 45-65 years male patients, duration less than 3 weeks, Motor assessment scale for sitting to standing score 1-Gets to standing with help from therapist (Any method) and able to follow verbal commands.

Exclusion: Anterior cerebral artery and Posterior cerebral artery stroke patients. Cerebellar and brainstem lesion patients. Orthopaedic problem such as fracture, arthritis, deformity in lower limbs. Haemorrhagic stroke, Visual impairment and hearing deficits.

SAMPLE SIZE:

A total of 16 hemiparesis patients who fulfilled the inclusion criteria were selected for the study and randomly allocated in to two groups.

SAMPLING TECHNIQUE:

Convenient sampling.

- Group A – 8 patients (Right hemiparesis)
- Group B – 8 patients (Left hemiparesis)

TREATMENT PROCEDURE:

A written consent was obtained from the patients who fulfilled the inclusion criteria. Pretest score will be taken using the sit to stand item of Motor Assessment Scale (MAS), prior to the treatment session. Subjects were allocated into two groups randomly Group – A and Group – B.

Both the groups received Motor Relearning Programme for sit to stand for duration of two weeks (40 mins/session, 5 session/ week, total 10 sessions) and the post test was taken using the sit to stand item of Motor Assessment Scale after two weeks.

MATERIALS USED

- Plinth (50 cm height)
- Outcome measure: Motor assessment scale (MAS) standing up item

INTERVENTION:

Motor Relearning Programme for sit to stand essential components are: Standing up,

Foot placement, Inclination of trunk forward by flexion at hips with extended neck and spine,

Movement of the knees forward, Extension of hips and knees for final standing alignment.

Figure. 1, 2&3.

STEP 1: ANALYSIS OF STANDING UP.

The common problems are, Weight is borne principally through the intact side, Inability to shift centre of gravity sufficiently forward, Patient tries to shift weight forward by flexing trunk and head instead of hips, Failure to place affected foot ensures that the patient, who already has this tendency, will stand up with all weight taken through the intact foot.

STEP 2: PRACTICE OF MISSING COMPONENTS.

To train trunk inclination forward at hips (with knee movement forward), Move your shoulders in front of your feet and push down and back through your feet, Push down more through affected foot, Look straight ahead.

STEP 3: PRACTICE OF STANDING UP. With his shoulders and knees forward, the patient practices standing up, the patient is instructed to push down through his affected foot by pushing down through his knee along the line of shank while moving it forward.

STEP 4: TRANSFERENCE OF TRAINING INTO DAILY LIFE

Figure.1

Figure.2

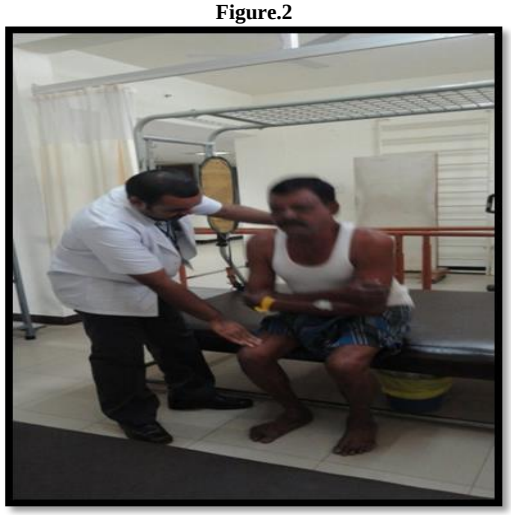

Figure.3

STATISTICAL ANALYSIS

The results are presented in the form of mean and standard deviation in the **table.1.** Pre-test and post-test values of the study were collected and assessed for variation in improvement & their results were analyzed using independent 't' test and paired 't' test.

RESULT

PAIRED 't' TEST: Motor Assessment Scale: (Sit To Stand Item)

GROUP – A (RIGHT HEMIPARESIS) Table.2

The pre-test and post-test values of Motor Assessment Scale score – sit to stand item was analysed using the paired `t' test. For 7 degrees of freedom and at 5% level of Significance, the table `t' value is 2.365, and the calculated t value is 8.33. Since the calculated` t' value was greater than table ` t' value, null hypothesis is rejected. Hence there is a significant difference in sit to stand performance between right and left hemiparetic stroke patients following motor relearning programme.

GROUP – B (LEFT HEMIPARESIS) Table.3

The pre-test and post-test values of Motor Assessment Scale score – sit to stand item was analysed using the paired `t' test. For 7 degrees of freedom and at 5% level of Significance, the table `t' value is 2.365, and the calculated t value is 12.37. Since the calculated` t' value was greater than table ` t' value, null hypothesis is rejected. Hence there is a significant difference in sit to stand performance between right and left hemiparetic stroke patients following motor relearning programme.

INDEPENDENT 't' TEST: Motor Assessment Scale: (Sit to Stand Item)

PRE-TEST VALUES OF GROUP A (RIGHT HEMIPARESIS) AND GROUP B (LEFT HEMIPARESIS) Table.4

The pre-test values of Motor Assessment Scale score – sit to stand item of both the groups was analysed using independent `t' test. For 14 degrees of freedom and at 5% level of Significance, the table ` t 'value 2.144 and the calculated `t' value is 0. Since the calculated `t' value is lesser than table `t' value, there is no significant difference existing between the pre-test values of both groups. Thus, the homogeneity between both groups is maintained.

POST TEST VALUES OF GROUP A (RIGHT HEMIPARESIS) AND GROUP B (LEFT HEMIPARESIS) Table.5

The post-test values of Motor Assessment Scale score – sit to stand item of both the groups was analysed using independent `t' test. For 14 degrees of freedom and at 5% level of Significance, the table `t' value is 2.144 and the calculated `t' value is 3.76. Since the calculated `t' value is greater than the table `t' value, null hypothesis is rejected. Hence there is a significant difference in sit to stand performance between right and left hemiparetic stroke patients following motor relearning programme.

TABLES:

Table:1 DEMOGRAPHIC DATA OF THE STUDY PARTICIPANTS						
CHARACTERISTICS	**GROUP – A**			**GROUP - B**		
	MEAN	**S.D***	**RANGE**	**MEAN**	**S.D***	**RANGE**
AGE	59	±6.07	45 - 65	57	±4.02	47 - 60
SEX	8 Male	-	-	8 Male	-	-
ARTERY INVOLVEMENT	Middle cerebral artery	-	-	Middle cerebral artery	-	-
TYPE OF STROKE	Ischemic	-	-	Ischemic	-	-
SIDE OF LESION	Left			Right		
TIME SINCE STROKE ONSET	3	±1	2 - 4	3	±1	2 - 4

PAIRED 't' TEST:

TABLE 2: GROUP - A (RIGHT HEMIPARESIS) SIT TO STAND ITEM OF MOTOR ASSESSMENT SCALE

Scale	Mean values		Calculated 't' value	Table 't' value	Level of Significance
	Pre test	Post test			
Motor assessment scale – sit to stand item	1	4.5	8.33	2.365	P < 0.05 and significant

TABLE 3: GROUP - B (LEFT HEMIPARESIS) S IT TO STAND ITEM OF MOTOR ASSESSMENT SCALE

Scale	Mean values		Calculated 't' value	Table 't' value	Level of Significance
	Pre test	Post test			
Motor assessment scale – sit to stand item	1	3.5	12.37	2.365	P < 0.05 and significant

INDEPENDENT 't' TEST:

TABLE 4.: PRE-TEST VALUES OF GROUP – A (RIGHT HEMIPARESIS) & GROUP – B (LEFT HEMIPARESIS) SIT TO STAND ITEM OF MOTOR ASSESSMENT SCALE

Scale	**Pre test mean values**		**Calculated 't' value**	**Table 't' value**	**Level of Significance**
	Group – A	**Group - B**			
Motor assessment scale – sit to stand item	1	1	0	2.144	P > 0.05 and not significant

TABLE 5: POST TEST VALUES OF GROUP – A (RIGHT HEMIPARESIS) & GROUP – B (LEFT HEMIPARESIS) SIT TO STAND ITEM OF MOTOR ASSESSMENT SCALE

Scale	**Post test mean values**		**Calculated 't' value**	**Table 't' value**	**Level of Significance**
	Group – A	**Group - B**			
Motor assessment scale – sit to stand item	4.5	3.5	3.76	2.144	P < 0.05 and significant

DISCUSSION

Sit to stand is one of the most common daily activities and is performed in everyday life without an effort by healthy individuals. Once health situation is impaired we can see a quite different situation. Thus successful performance of sit to stand becomes one of vital factors for further possibilities of movement. For majority of population sit to stand is an automatic activity and economical task performance.

Stroke is a leading cause of long-term disability and significant proportion of individuals undergoing rehabilitation. Standing up is a common functional task that can be affected after residual impairments of stroke. Common impairments in patients who have had a stroke may be unable to use upper extremity support due to weakness; foot placement may be influenced by visuospatial deficits, ankle and knee immobility or weakness. Hemi neglect has also been correlated with lower functional scores[13-15].

Cognitive impairment has also been associated with functional task and could interfere with task sequencing and safety[16]. Cognitive ability plays an important role in motor relearning and may limit individual's ability to organize new resources for example altered motor function, somato-sensory changes for Sit& stand task [17].

The complexity of sit to stand task should not be seen as a measure of leg strength alone, rather it has many variables physical, cognitive, emotional, and environmental influence the task performance[18-20]. Sit to stand represent a useful screening task for a variety of impairments such as attention, basic cognition, safety, strength, range of

motion, and balance. The coexistence of multiple impairments impacts one's ability to stand up and influence functional outcome post stroke.[21, 22]

Following stroke individuals have demonstrated abnormal motor sequencing, interrupted and prolonged motor activation, decreased motor output, increased postural sway, bilateral abnormalities and asymmetry in sit to stand. People with stroke have deficits in motor programme, motor memory, and associated feedback and feed forward mechanisms, which largely impair their functional performance. Sensory and perceptual deficits are more severe in patients with left hemiparesis than in the patients with right hemiparesis. The lesion in the right hemisphere could distort the spatial information required for the control of balance, which is reflected by left hemiparetic patients having poor functional performance in sit to stand task than right hemiparetic patients. The motor relearning programme for sit to stand promotes the learning of normal motor skills through the task oriented approach with appropriate feedback and active participation of the patients.

The findings of this study correlate with the previous results that right hemisphere lesion patients shows more difficulty in maintaining the physical postures because of visuospatial deficits due to impairment in perception and information processing skills. Thus following a right hemisphere lesion there will be distortion of the spatial information which leads to poor balance abilities[23, 24].

In the study patients with right hemisphere lesion showed difficulty in foot placements during the practice of task from sit to stand when compared to that of left hemisphere lesion. Studies also show that right hemisphere lesion patients show a poor outcome when compared to the left hemisphere lesion. Hence, it should be remembered that when treating right hemisphere lesion patients, effective screening of the impairments should be done which helps in determining efficient treatment strategies that will improve the functional performance of the patients.

In the study values of Motor Assessment Scale score – sit to stand item of Group A (right hemiparesis) showed a significant difference than the Group B (left hemiparesis) stroke patients. Hence there is a significant difference in sit to stand performances among right and left hemiparesis stroke patients following motor relearning programme which can be attributed to the hemisphere differences. Future studies with larger groups and longer duration are required to confirm the findings and to find whether the functional improvements are maintained after cessation of training and whether there is a measured improvements transferred in to the other environmental contexts.

CONCLUSION

The findings of this study suggest that Motor Relearning Programme improve the functional performance of sit to stand. Right hemi paresis patients had slightly significant improvement than Left hemi paresis patients. Hence there is a significant difference in sit to stand performance between right and left hemi paretic patients following Motor Relearning Programme.

Declaration by Authors

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