

ORIGINAL RESEARCH

IJPHY

EFFECTIVENESS OF THE MOTOR RELEARNING APPROACH IN PROMOTING PHYSICAL FUNCTION OF THE UPPER LIMB AFTER A STROKE

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ABSTRACT

Background: More than decades Stroke is one of the most frequently occurring disabling disease in the world. Reduced upper extremity function affects the ability to perform activities of daily living, which is likely to reduce independence, function of upper extremity is more difficult than the lower extremity. It can seriously impact the progress of rehabilitation.

Methods: 60 outpatients are identified irrespective of hemorrhagic or thrombotic stroke, among those 30 patients received 40 1-h sessions in eight weeks (5 days/week) of conventional physiotherapy programme taken as group-A and another 30 patients were received 40 1-h sessions in eight weeks (5 days/week) of Motor relearning programme taken as group-B.

Results: After the treatment sessions Patients who received motor relearning programme showed significantly better functional ability when assessing their functional status by task oriented performance than the conventional physiotherapy programme in both outcome scoring values, mean age of the subject who participated in study is 51 years.

FMA (n = 30 post-test mean = 32.27 GROUP-A post-test mean = 43.80 GROUP-B
T test value t = 5.3743, p- value = < 0.0001)

WMFT (n = 30 post-test mean = 39.80 GROUP-A, post-test mean = 71.45 GROUP-B
T test value t = 10.3401, p- value = < 0.0001)

Conclusion: Motor relearning programme is found to be effective than the conventional physical therapy programme for enhancing functional recovery of the upper limb in stroke patients.

Key words: stroke, motor relearning programme, conventional physiotherapy programme, wolf motor function test, conventional physiotherapy programme, and fugl-meyer assessment of upper extremity.

Received 14th October 2014, revised 24th November 2014, accepted 02th December 2014



www.ijphy.org

DOI: 10.15621/ijphy/2015/v2i1/60047

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INTRODUCTION

Stroke is one of the most frequently occurring disabling diseases in the world.

Stroke is a clinical syndrome describing a range of disorders which results in focal cerebral ischemia. The world health organisation (WHO) definition of stroke has been widely used. Stroke is defined as 'rapidly developing clinical signs of focal or global disturbance of cerebral function, with symptoms lasting 24 h or longer, or leading to death, with no apparent cause other than of vascular origin'

Stroke definition includes both cerebral infarction and intracerebral subarachnoid haemorrhage. The primary causes of strokes: cerebral thrombosis, cerebral embolism and cerebral haemorrhage, some risk factors like hypertension, heart disease, diabetes, high cholesterol and obesity.

The number of stroke survivors has almost doubled over the last 25 years, and is predicted to double again in the next 50 years. Currently, stroke is the leading cause of disability in the world. More than half of the 4.7 million stroke survivors have residual motor disability, and of these, 30-66 percent has a non-functional paretic arm. Impaired upper extremity function is a common and often devastating problem for stroke survivors. Reduced upper limb function affects the ability to perform activities of daily living, which is likely to reduce independence and increase burden of care.

Different therapeutic approaches have been developed to enhance the functional recovery of patients after stroke. There is a need for effective rehabilitation therapy for post-stroke upper extremity problems. Motor relearning programme is one of the rehabilitative strategies used primarily with the post-stroke population.¹ Scientific research supports in MRP improving function after stroke. Motor relearning programme was developed based on motor learning theory by Carr and Shepherd,^{2,3,4} who proposed that training in motor control requires anticipatory actions and ongoing practice. This study is to investigate the better outcome for upper extremity function in stroke patients with the Motor Relearning Programme.

MATERIALS AND METHODOLOGY

60 subjects were selected for study. Includes male and female post stroke hemiplegic patients. Subjects were chosen from department of physiotherapy, Arogya multi speciality hospital, Ongole, using randomized sampling method.

40 sessions of treatment given (five times in a week for eight weeks) with each treatment lasting for 60 minutes. Following scales used as outcome measures:

Wolf motor function test (WMFT), Fugl-Meyer assessment upper extremity (FMA)

INCLUSION CRITERIA:

Age between 40-65 years. Both male and female patients. First-ever stroke verified clinically and (CT), who had no Proprioceptive deficits or visual problems? Motor recovery of hand Brunnstrom stages 3 or 4.

EXCLUSION CRITERIA:

Patients Who Had Proprioceptive Deficits, Severe Deformities, Vestibular Disorders, Non co-operative and mentally unstable persons.

ETHICAL CLEARANCE

Subjects are informed about the study and their consent is taken for the participation in the study. Consent is taken from college ethical board.

PROCEDURE

Among those 60 patients selected for study we randomly divided as two groups. Conventional physiotherapy programme (GROUP-A.)

30 patients received 40 1-h sessions in eight weeks (5 days/week) of conventional physiotherapy programme taken as group-A. Conventional physiotherapy programme includes following steps as the treatment plan.

1. Positioning 2. Passive movements. 3. Weight bearing 4. Electrical stimulations. 5. Active movements

Motor relearning programme (GROUP-B.)

30 patients were received 40 1-h sessions in eight weeks (5 days/week) of Motor relearning programme taken as group-B.

Motor relearning programme includes following steps as the treatment plan.

Step 1: analysis of task. (i. Observation, ii. Comparison, iii. Analysis) Step 2: practice of missing components. (i. Explanation - identification of goal, ii. Instruction, iii. Practice + verbal and visual feedback + manual guidance) Step 3: practice of task. (i. Explanation - identification of goal, ii. Instruction, iii. Practice + verbal and visual feedback + manual guidance, vi. Re-evaluation, v. Encourage flexibility) Step 4: transference of training. (i. Opportunity to practice in context, ii. Consistency of practice, iii. Organization of self-monitored practice, vi. Structured learning environment, v. Involvement of relatives and staff)

Training programme (specific motor task) to improve upper limb function,

1. To elicit muscle activity and train motor control for reaching and pointing.

2. To elicit muscle activity and train motor control for manipulation to train wrist extension.

3. To train palmar abduction and rotation of the thumb (opposition).
4. To train opposition of radial and ulnar sides of hand.
5. To train manipulations of objects.
6. To improve the use of holding objects for daily use

DATA ANALYSIS

Data analysis plays an extremely important role in planning of good study. In this study the analysis of efficacy of motor relearning programme and the success rate of the approach was done using Student paired t test. For this study 60 subjects of clinically selected according to the inclusion criteria, among those patients divided as two groups, GROUP-A which is receiving conventional physiotherapy programme and GROUP-B which is receiving Motor relearning programme. All subjects are assessed before (pre test) and after completion of 8 weeks (post test) with two outcome measures fugl-meyer assessment score and wolf motor function score. After completion of study among the two groups we have taken the two outcome measures post test values as the reference. With the functional analysis data collected, among the two groups group-A FMA pre-test mean score 20.7 where as post test mean score 32.27. WFMT pre test mean score 33.7 where as post test mean score 39.80, group-B FMA pre test mean score 20.7 where as post test mean score 43.80, WMFT pre test mean score 35.80 where as post test mean score 71.45. observed differences and values tested with unpaired t test measurement.

UNPAIRED T TEST RESULTS FUGL-MAYER ASSESMENT

P value and statistical significance:

The two-tailed P value is less than 0.0001 by conventional criteria; this difference is considered to be extremely statistically significant.

Confidence interval:

The mean of Group One minus Group Two equals -11.53

95% confidence interval of this difference: From -15.83 to -7.24

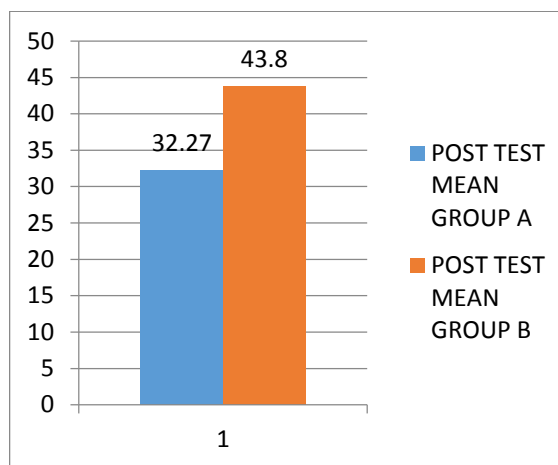
Intermediate values used in calculations:

$$t = 5.3743$$

$$df = 58$$

$$\text{standard error of difference} = 2.146$$

	Group A	Group B
Mean	32.27	43.80
SD	5.03	10.62
SEM	0.92	1.94
N	30	30



UNPAIRED T TEST RESULTS WOLF MOTOT FUNCTION TEST

P value and statistical significance:

The two-tailed P value is less than 0.0001

By conventional criteria, this difference is considered to be extremely statistically significant.

Confidence interval:

The mean of Group One minus Group Two equals -31.65

95% confidence interval of this difference: From -37.78 to -25.52

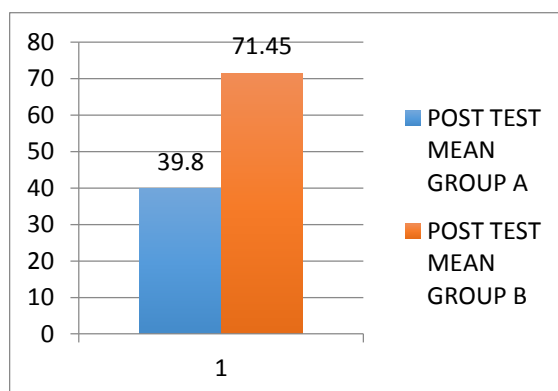
Intermediate values used in calculations:

$$t = 10.3401$$

$$df = 57$$

$$\text{standard error of difference} = 3.061$$

	Group A	Group B
Mean	39.80	71.45
SD	4.88	16.02
SEM	0.89	2.97
N	30	30



RESULTS

In this study a total of 60 patients selected randomly to give motor relearning programme. The mean age of subjects, there were 31 male and 29 female patients, either suffered from left or right hemiplegia, divided as two groups.

30 patients received 40 1-h sessions in eight weeks (5 days/week) of conventional physiotherapy programme taken as group-A and another 30 patients were received 40 1-h sessions in eight weeks (5 days/week) of Motor relearning programme taken as group-B.

In this study each subject demonstrated gradual increase in the upper limb function and performing several tasks in the daily life.

All subjects who were participated in study show significant differences in their pre test and post test scores on the two outcome measures. Student's t test were conducted on each outcome measure.

FMA (n=30 post test mean=32.27 GROUP-A post test mean=43.80 GROUP-B
t test value t = 5.3743 p-value = < 0.0001)

WMFT (n=30 post test mean=39.80 GROUP-A, post test mean=71.45 GROUP-B
t test value t = 10.3401, p-value = < 0.0001)

Values of the subject's shows effect of motor relearning programme were statistically significant on both used outcome measures.

DISCUSSION

Results of my study indicate that patients with hemiplegia benefited from specific motor relearning approach. All subjects showed immediate improvements in tasks involving upper limb functions. The eight week motor relearning programme emphasizing function based training appeared more effective for enhancing the functional recovery of post stroke patients compare to other.^{5,6}

Motor learning theory describes the ways in which motor patterns can be acquired and modified through experiential learning, such as through Observations and repeated practice.

The major assumptions about motor control underlying this programme is the "regaining the ability to perform motor tasks, involves a learning process (practice, get feedback, understand the goal)" several parts of the central nervous system may mediate the same motor function. That is, a part of neural system may adequately mediate the function normally subserved by the system as a whole.

The motor relearning approach promotes the regaining of normal motor Skills through task-

oriented practice with appropriate feedback and the active participation of the patients^{7,8,9}

In this study, the motor relearning programme was structured in such a way that patients had ample opportunity to gain this experience. First, the patients were involved in identifying their own problems in performance.

These problems are called the missing-performance components. The selection of the remedial tasks used for training was meant to target those missing-performance components. Training in the functional tasks followed through on the same missing components. The training thus became more anticipatory for the patients and hence was more self-initiated, targeted and effective.

The second feature of the motor relearning programme was the emphasis placed on the transfer of skills between the remedial and functional tasks (steps 2 and 3 in the clinical protocol). The key was having the therapist verbalize the relationship between what was practiced in these two steps with the actual performance of daily tasks.

The third feature of the motor relearning programme was the sequential organization of the function-based intervention. Both the remedial and functional tasks were organized the patients in the motor relearning programme were found to perform significantly better on self-care and ADL tasks, ADL tasks are complicated in nature, and their performance usually requires higher motor and cognitive functions, as well as generalization of the skills learned.

After 40 sessions of programme in all subjects shown improvement in upper limb function through both outcome measures. In this study the main outcome measures what we used is to show the better results for upper extremity function Fugl-meyer assessment and wolf motor function test.^{10, 11} Patients after stroke usually have upper limb functional difficulties. So there tend to be more effective physical therapy to enhance functional recovery^{12, 13, 14}

Carr and Shepherd's motor relearning programme provides the theoretical foundation for the present study. The findings of this clinical trial reveal that 'function-based' task oriented training are equally important for enhancing patients' functional recovery after stroke.

CONCLUSION

Stroke is one of the most frequently occurring disabling diseases in the world.

According to the world health organization, 15 million people suffer stroke worldwide each year. Of these, 5 million die and another 5 million are permanently disabled (world health report by WHO)

Motor relearning programme (MRP) is a rehabilitative strategy used primarily with the post-stroke population. This therapy increases the functional use of the neurologically weaker extremity through massed practice of functional activity with task performance. MRP is reported to significantly improve functional use of the upper extremity in 20 to 25 percent of people with chronic stroke disability.

Motor relearning programme (MRP) is found to be more effective than the Conventional physiotherapy programme.

Results of many studies have demonstrated significant and lasting improvements of upper extremity movement function.

In my study MRP is proved that this is one of the approach to overcome and to improve functional use of the more-affected upper extremity.

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Citation

Suneel Kumar Immadi, Kiran Kumar Achyutha, Dr. Amaranth Reddy, Krishna Priya Tatakuntla. (2015). EFFECTIVENESS OF THE MOTOR RELEARNING APPROACH IN PROMOTING PHYSICAL FUNCTION OF THE UPPER LIMB AFTER A STROKE. *International Journal of Physiotherapy*, 2(1), 386-390.