RESEARCH PAPER

Impact of Motor Relearning Program over Traditional Management Program on Gross Motor Function among Stroke Subjects

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Abstract

Aim and Objective: Stroke is classified as a neurological condition brought on by a vascular brain damage or malformation that happens when there is inadequate blood flow to the brain. It mainly affects posture, balance, reflexes, muscle tone, and body movement and muscle coordination. The study's goal was to find out how well a motor relearning program worked for stroke patients' gross motor function compared to traditional management.

Methods: Among the selected 20 subjects, 10 subjects are involved in Group-A were performed Motor Relearning Program and remaining 10 subjects are involved in group-B were performed Traditional Management. Subjects are selected through the method of simple randomized sampling method. Patients treated for 3 Sessions/week for 2 months in Outpatient Physiotherapy department at ACS Medical College and Hospital.

Result: Among stroke patients, a comparison of Groups A and B revealed a significant difference in effectiveness on motor function (P value >0.0001). With a difference of 43.38 and 1.50 over 27.69 and 0.650, respectively, in the Gross Motor Function Classification System (GMFCS) and Motor Assessment Scale (MAS), Group A with the Motor Relearning Program was found to be more effective than Group B with Traditional Management.

Conclusion: Motor Relearning Program is best method for improvement of on Gross motor function in Subjects with Stroke.

Keywords: Stroke, Motor Relearning Program, Gross Motor Function Classification System, Motor Assessment Scale

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INTRODUCTION

A stroke, also referred to as a cerebrovascular accident (CVA), is an abrupt cessation of blood flow to a section of the brain, which leads to neuronal damage, neurological impairments, and potentially fatality. It poses a significant global health issue, being one of the primary contributors to death and long-term disability around the world 1.

There are two principal types of strokes, Ischemic stroke and Hemorrhagic stroke. Ischemic stroke, which constitutes about 85% of all cases, results from a blockage in an artery that, supplies blood to the brain, typically caused by a thrombus or embolism. Hemorrhagic stroke is accounting for roughly 15% of cases, occurs when a blood vessel in the brain breaks, causing bleeding into or around the brain tissue 2.

Transient ischemic attacks (TIAs) often referred to as "mini-strokes," involve temporary blockages that do not result in lasting brain damage but act as significant indicators for the possibility of future strokes. The effects of a stroke can vary greatly, depending on the size and location of the affected brain region. These effects may include paralysis or weakness (typically affecting one side of the body), difficulties with speech and language (known as aphasia), cognitive challenges, emotional issues, and diminished sensory abilities. Recovery is frequently incomplete and may result in a considerable reduction in independence and quality of life 3.

Stroke is a multifactorial disease influenced by a range of modifiable risk factors—such as hypertension, diabetes, smoking, obesity, and dys-lipidemia and non-modifiable factors, including age, sex, ethnicity, and genetic predisposition. In the past few decades, major advances have been made in acute stroke management, notably through the use of thrombolytic, mechanical thrombectomy, and specialized stroke units. However, rehabilitation remains a critical component of stroke care, aiming to maximize functional recovery, promote neuroplasticity, and improve the overall quality of life for survivors4.

The burden of stroke is especially high in low- and middle-income countries, where access to acute care and rehabilitation services is often limited. As the global population ages, the incidence of stroke is projected to rise, making prevention, early intervention, and effective rehabilitation increasingly important public health priorities5.

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Recent research emphasizes not only saving lives but also enhancing recovery through early, intensive, and targeted rehabilitation programs including task-specific training, Neuroplasticity-driven therapies, and technology-enhanced interventions6,7.

Aim of the study: To investigate the effectiveness of Motor Relearning Program over Traditional Management on Gross motor function in Subjects with Stroke.

Need of the study: As there are many interventions program for subjects with stroke to get back to near to normal, motor relearning- which is one of the most important features for stability of upper extremity, core stability, spinal muscles, ligaments & lower extremities either in sitting and standing, has to be concentrated while treating subjects stroke. This is an experimental type-randomized control trail Sampling. It was Comparative study – Pre and Post type.

Allocation method: A total of 20 samples were selected based on specified inclusion and exclusion criteria and were randomly assigned into two experimental groups, A and B, using a lottery method. Each group consisted of 10 samples. Group A underwent training using the Motor Relearning Program, while Group B received Traditional Treatment.

The study was conducted at A.C.S. Medical College and Hospital located in Vellappanchavadi, Chennai-77, over the course of 5 sessions per week for a duration of 8 weeks. The total number of subjects involved in the study was 20, with each group consisting of 10 participants.

Inclusion criteria: The study included both male and female patients aged 45 to 64 who had experienced a stroke and were able to sit and stand independently with the use of an aid or orthotic, regardless of whether they required supervision or assistance. Participants who could independently maintain a seated position for 30 seconds on a stable surface and were medically stable were also eligible for inclusion in the study.

Exclusion criteria: Subjects with Significant disability. Other exclusion criteria were orthopedic/neurological impairments that could influence sitting balance, and perform a coordinated movement, inability to understand instructions and difficulty for sitting and standing.

Materials used: Stop watch, Toys (whistling), Rainbow Music Desk Bells, Rainbow blocks, Different shapes of Blocks, Peg board

Measurement tools: Gross motor function classification system (GMFCS) level II & IV, And Motor assessment scale

Outcome measures: Primary functional motor activities - Motor Learning, through play therapy, movement initiate the motor functional activity.

Procedure: The research was an experimental study employing a pre and post design. This investigation was carried out in the Outpatient Physiotherapy Department of ACS Medical College and Hospital, featuring an intervention period of 8 weeks and an overall study duration of 6 months. The study received approval from the institutional review board, and 20 samples were chosen based on the established selection criteria

Verified stroke is diagnosis with the capacity to move in ways other than sitting and to understand the trainers' directions. Using a straightforward random sample technique, the participants were divided into two groups. After receiving a thorough explanation of the study, the parents were asked to sign a consent form indicating their willingness to participate. First, demographic information such as height, weight, gender, and age will be gathered. Group B received conventional stroke care, while Group A received motor relearning. Each study session lasted one hour and thirty minutes. The Gross Motor Function Classification System (GMFCS) and the Motor Assessment Scale were used to measure the subjects before and after the exam.

Interventions:

Group-A: Motor Relearning Techniques: The motor learning coaching method adhered to the fundamentals of motor learning and used them in sessions that were centered on activities. The method focuses on using augmented feedback that corresponds to the learner's phases while performing motor skills in a random order across several environments.

Physical therapists had completed the motor relearning program and had at least two years of experience treating stroke patients treated the stroke treatment group. According to the status and severity, this course focused on the phases of task learning, such as practice variability and the kind of augmented feedback. For continuity, physiotherapists documented the actions during each session. Missed sessions were rescheduled as soon as feasible.

Group-B: Traditional exercise: The goal of intervention in the traditional exercise treatment strategy is to help the participants recover by altering the way their bodies function and structure. The goal of the non-rigid therapy plan is to improve muscle tone and movement patterns. It is believed that functional benefits result from "typical" movement patterns.

A structured program was established for each subject after the therapist precisely identified the motor tasks (e.g., increased sitting stability) and goals (e.g., standing or walking). Legs were passively stretched at the start of each session of this program. Walking, getting up from a sitting position, and sitting were examples of functional motor activities. At the conclusion of each session, these were practiced. Optimal sensorimotor

processing, task performance, and skill acquisition are believed to be activated by this therapeutic handling and engagement, which will ultimately enable the individual to engage in meaningful activities and improve their quality of life.

Data Analysis

Group A – Motor Relearning

Table 1: Paired t test on Gross Motor Function Scale within the Group A on motor relearning among subjects with stroke.

GMFS	Mean (Score)	Number of Pairs	Mean Diff.	SD, SEM	DF	t	P value	Sig.Diff. (P < 0.05)
Pre Test	51.74	10	41.39	7.27 2.30	9	18.02	<0.0001	****
Post Test	93.12							

The above table 1 shows significant difference in Gross Motor Function Classification System on motor learning among stroke subjects with P value >0.0001.

Table 2: Paired t test of Motor Assessment Scale within Group A on motor learning among stroke subjects
The above table 2 shows significant difference in Motor Assessment Scale on motor learning among stroke subjects with P value >0.0001.

MAS	Mean (Score)	Number of Pairs	Mean Diff.	SD, SEM	DF	t	P value	Sig. Diff. (P < 0.05)
Pre-Test	1.60	10	1.50	0.67 0.21	9	7.13	<0.0001	****
Post Test	3.10							

Group B – Traditional Management

Table 3: Paired t test on Gross Motor Function Scale within the Group B on motor learning among stroke subjects.

GMFS	**Mean (Score)**	**Number of Pairs**	**Mean Diff.**	**SD, SEM**	**DF**	**t**	**P value**	**Sig.Diff. (P < 0.05)**
Pre-Test	41.90	10	27.69	8.502 2.689	9	10.30	<0.0001	****
Post -Test	69.60							

The above table 3 shows significant difference in Gross Motor Function Classification System on motor relearning among stroke subjects with P value >0.0001.

Table 4: Paired t test of Motor Assessment Scale within Group B on motor learning among stroke subjects.

MAS	**Mean (Score)**	**Number of Pairs**	**Mean Diff.**	**SD, SEM**	**DF**	**t**	**P value**	**Sig. Diff. (P < 0.05)**
Pre-Test	1.40	10	0.650	0.41	9	4.99	<0.0007	***

Post Test	2.05			0.13				

The above table 4 shows significant difference in Motor Assessment Scale on motor relearning among stroke with P value >0.0007.

Table 5: ANOVA to compare GMFS between Group A and B

Out come Measures	Exercise Group A and B	Test	Mean	Mean Diff.	R Square	F	P value	Sig. diff. (P < 0.05)
GMFS	Motor Learning	Pre test	41.90	27.69	0.844	64.93	<0.0001	****
		Post Test	69.60					
	NDT	Pre test	51.73	43.38				
		Post Test	93.11					

The above table 5 shows significant difference on GMFS between Group A and B with P value <0.0001.

Table 6: ANOVA to compare MAS between Group A and B

Out come Measures	Exercise Group A and B	Test	Mean	Mean Diff.	R Square	F	P value	Sig. diff. (P < 0.05)
MAS	Motor Learning	Pre test	1.40	0.650	0.592	17.38	<0.0001	****
		Post Test	2.05					
	NDT	Pre test	1.60	1.500				
		Post Test	3.10					

The above table 6 shows significant difference on MAS between Group A and B with P value <0.0001.

RESULT

Among stroke patients in this study, GMFS improved with a mean difference of 43.38 due to motor relearning, with a P value >0.0001.

Among stroke patients in this study, GMFS improved with a mean difference of 27.69 when using traditional exercise, with a P value >0.0001.

In this study, MAS has improved among stroke patients using the motor relearning technique, with a mean difference of 1.50 and a P value >0.0001.

In this study, MAS has improved among stroke patients with a mean difference of 0.650 while using traditional exercise, with a P value greater than 0.0001.

Among stroke patients, a comparison of Groups A and B revealed a substantial difference in effectiveness on motor function (P value >0.0001). In GMFS and MAS, the mean difference between Group A's motor relearning and Group B's traditional exercise was 43.38 and 1.50, respectively, compared to 27.69 and 0.650.

DISCUSSION

The findings of this study suggest that the Motor Relearning Program (MRP) is more effective than traditional management approaches in improving gross motor function in individuals post-stroke. Participants who underwent MRP demonstrated significantly greater improvements in gross motor abilities compared to those who received conventional rehabilitation 8.

These results align with existing literature that emphasizes the importance of task-specific training and functional reorganization of motor patterns for stroke rehabilitation. Unlike traditional methods, which often focus on passive modalities and generalized strengthening, the MRP emphasizes active, goal-directed tasks, motor control training, and contextual practice. This likely contributed to enhanced motor planning and execution in real-world activities, which are key components of gross motor function 9.

One of the core principles of MRP is repetitive practice of meaningful tasks, which aligns with theories of neuro plasticity—the brain's ability to reorganize and form new connections in response to training. This supports the idea that targeted motor learning strategies can accelerate recovery and improve functional outcomes more efficiently than traditional therapies10.

Strength of the MRP approach is its emphasis on problem-solving and feedback, which may lead to improved motor retention and self-efficacy in patients. In contrast, traditional methods may lack sufficient engagement and often rely more on therapist-driven movement facilitation than patient-driven task performance11.

However, certain limitations should be acknowledged. The sample size in this study may not fully represent the broader stroke population, especially those with severe cognitive deficits or comorbidities that might affect

participation in an intensive motor relearning protocol. Additionally, long-term follow-up data were not included, so it is unclear whether the observed benefits of MRP are sustained over time12.

Despite these limitations, the present findings provide strong support for incorporating MRP into standard stroke rehabilitation protocols. Further research is recommended to explore the effects of MRP on different subtypes of stroke, as well as its integration with technologies like virtual reality or robotic-assisted therapy13.

A comparative study between MRP and the Bobath approach found that MRP led to more significant improvements in upper limb motor function, including gross motor abilities, in stroke patients14.

Research indicates that motor relearning programs and task-specific training both significantly enhance upper limb functions—such as dexterity, grip strength, and gross movements—in chronic stroke patients15.

A literature review encompassing 15 studies concluded that both MRP and mirror therapy have a substantial positive impact on improving gross and fine motor functions of the upper extremity in individuals with chronic stroke16.

Ethical clearance: Ethical clearance was obtained from the ethical Institutional Review Board of Faculty of Physiotherapy, Dr. MGR. Educational and Research Institute, Chennai with reference No: B28/PHYSIO/IRB/ 2019-2020 approval letter dated 17/01/2020.

Conflicts of Interest: There is no conflict of interest to conduct and publish this study.

Fund for the study: This is self-funded study, no fund received from any organization.

CONCLUSION

In motor relearning and traditional treatment techniques, the Motor Relearning Program (MRP) showed more improvement in sitting to standing position in subjects with stroke. Therefore, this study concludes that MRP is an effective intervention for stroke patients.

In Future studies need to determine when MRP techniques for sitting to standing programs should be performed. In addition, more studies needed to examine the factors of MRP which can improve the positions from sitting to standing and strengthen the Trunk, Upper & Lower extremities of Muscles.

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