

ROLE OF PHYSIOTHERAPY IN POST-STROKE REHABILITATION

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Abstract

Background:-

Stroke is one of the leading causes of disability worldwide and commonly results in impaired motor function, balance, gait, and reduced independence. Physiotherapy is a cornerstone of stroke rehabilitation, aiming to restore functional ability and improve patients' quality of life.

Objective: To systematically review the effectiveness of physiotherapy interventions in improving motor function, gait, upper limb recovery, and long term outcomes in patients with stroke.

Methods: A systematic review of studies published between 2010 and 2025 was conducted using PubMed, Scopus, and the Cochrane Library. Randomized controlled trials, cohort studies, and meta analyses evaluating physiotherapy interventions in adult patients with acute and subacute stroke were included. Data from the selected studies were synthesized to evaluate the effectiveness of different rehabilitation approaches.

Results: The reviewed evidence indicates that early and intensive physiotherapy significantly improves motor recovery, balance, gait, and functional independence following stroke. Task oriented training, muscle strengthening, balance exercises, and early mobilization consistently demonstrated positive outcomes. Emerging interventions, including virtual reality and robot assisted rehabilitation, showed comparable effectiveness to conventional physiotherapy. Although minor adverse effects such as fatigue and muscle soreness were reported, individualized and supervised rehabilitation programs were found to be safe and effective.

Conclusion: Physiotherapy plays a fundamental role in post stroke rehabilitation by enhancing functional recovery, mobility, and independence. Early initiation and continued rehabilitation provide the greatest benefits. A multidisciplinary rehabilitation approach is recommended to optimize patient outcomes. Further high quality studies are needed to identify the most effective rehabilitation protocols and evaluate long term outcomes.

INTRODUCTION

Stroke is one of the leading causes of mortality and long-term disability worldwide, affecting millions of individuals each year. According to the World Health Organization (WHO), stroke is

characterized by the rapid onset of neurological deficits resulting from disturbances in cerebral blood flow and remains a major public health concern due to its high morbidity and mortality rates (1,2). Survivors often experience motor impairment, balance deficits, gait disturbances, muscle weakness, and reduced functional independence, all of which significantly affect their quality of life (2,3).

Rehabilitation is an essential component of stroke management, with physiotherapy playing a central role in restoring functional ability and promoting independence. Various rehabilitation approaches, including the Bobath concept, Neuro Developmental Treatment (NDT), task oriented training, balance exercises, gait training, and muscle strengthening, have been widely used to improve motor recovery and mobility following stroke (4). These interventions aim to enhance neuroplasticity, restore normal movement patterns, and maximize patients' ability to perform activities of daily living.

Early initiation and appropriate intensity of physiotherapy have been associated with improved functional outcomes, including better motor control, balance, gait performance, and upper limb function (5,6). Recent advances in rehabilitation, such as virtual reality based training and robot assisted therapy, have further expanded the range of treatment options available for stroke survivors.

Despite the growing evidence supporting physiotherapy in stroke rehabilitation, uncertainty remains regarding the most effective rehabilitation strategies, treatment intensity, and long term outcomes. Therefore, this systematic review aims to evaluate the current evidence on the effectiveness of physiotherapy interventions in improving motor function, gait recovery, upper limb function, and overall functional independence among patients with stroke.

Parameter	Details
Age / Gender	65-year-old male
Diagnosis	Right-sided ischemic stroke with left-sided hemiparesis
Duration since Stroke	Stroke occurred in 2024; physiotherapy started after 1 week
Medical History	Hypercholesterolemia; previous left knee surgery with intermittent pain; sedentary lifestyle due to office work
Chief Complaints	Left-sided weakness, inability to perform daily activities, dependent for basic tasks like sitting and sleeping

Results

The reviewed studies consistently demonstrate that physiotherapy is an essential component of post stroke rehabilitation. Early initiation of rehabilitation, particularly within the first week after stroke, was associated with improved motor recovery, balance, gait performance, and functional independence. Patients receiving structured physiotherapy programs generally achieved better outcomes than those receiving delayed or less intensive rehabilitation.

Common physiotherapy interventions included the Bobath concept, Neuro Developmental Treatment (NDT), task oriented training, gait training, balance exercises, muscle strengthening, weight bearing activities, and active assisted exercises. These interventions were effective in improving postural control, coordination, mobility, and performance of activities of daily living.

Functional outcomes were frequently assessed using validated tools such as the Barthel Index,

Functional Independence Measure (FIM), and Modified Rankin Scale. Most studies reported significant improvements in functional independence following regular physiotherapy, with greater benefits observed in patients who received individualized and supervised rehabilitation programs.

Several studies also evaluated advanced rehabilitation techniques, including virtual reality based training and robot assisted therapy. These approaches demonstrated effectiveness comparable to conventional physiotherapy and may provide additional motivation and engagement during rehabilitation. Although minor adverse events such as fatigue and muscle soreness were occasionally reported, physiotherapy interventions were generally considered safe and well tolerated.

Discussion

The findings of this systematic review support the important role of physiotherapy in improving functional recovery after stroke. Consistent evidence indicates that structured rehabilitation programs enhance motor function, balance, gait, and independence in activities of daily living. Early rehabilitation appears to maximize neuroplasticity and facilitate recovery during the critical post stroke period.

Among the various rehabilitation approaches, the Bobath concept remains one of the most widely applied methods. It focuses on restoring normal movement patterns, improving postural control, and reducing abnormal muscle activity through guided therapeutic techniques. Other interventions, including task oriented training, balance exercises, gait training, and muscle strengthening, have also demonstrated beneficial effects on mobility and functional performance.

Recent advances in rehabilitation, such as virtual reality and robot assisted therapy, have expanded treatment options for stroke survivors. Although current evidence suggests that these technologies provide outcomes comparable to conventional physiotherapy, they may improve patient engagement and adherence to rehabilitation programs.

Despite the positive findings, variations in study design, treatment intensity, rehabilitation duration, and outcome measures make direct comparisons difficult. Additional high quality randomized controlled trials are needed to establish standardized rehabilitation protocols and determine the long term effectiveness of different physiotherapy interventions.

Conclusion

Current evidence indicates that physiotherapy is a fundamental component of post stroke rehabilitation. Early, individualized, and structured rehabilitation programs significantly improve motor recovery, gait, balance, upper limb function, and overall functional independence. Conventional physiotherapy approaches, including the Bobath concept and task oriented training, remain effective, while emerging technologies such as virtual reality and robot assisted rehabilitation offer promising complementary strategies. Further well designed studies are recommended to optimize rehabilitation protocols and improve long term outcomes for individuals recovering from stroke.

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