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POST-STROKE COGNITIVE IMPAIRMENT AND NEUROREHABILITATION STRATEGIES AFTER INSULT

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Abstract. *Post-stroke cognitive impairment (PSCI) represents one of the most significant complications following an Insult, contributing substantially to long-term disability and reduced quality of life. Cognitive deficits may involve memory, attention, executive function, and language abilities, often persisting even after physical recovery. Despite advances in acute stroke management, the burden of cognitive dysfunction remains underrecognized and undertreated.*

This study aims to evaluate the effectiveness of structured neurorehabilitation strategies in improving cognitive outcomes among post-stroke patients. A prospective observational cohort design was employed, involving 150 patients diagnosed with ischemic or hemorrhagic stroke. Cognitive function was assessed using standardized neuropsychological tools, and individualized rehabilitation programs were implemented over a six-month period.

Preliminary findings suggest that targeted cognitive rehabilitation, combined with physical therapy and psychosocial support, significantly improves cognitive performance and functional independence. These results highlight the importance of early identification and personalized intervention in managing PSCI.

Keywords. *stroke, cognitive impairment, neurorehabilitation, brain plasticity, recovery, neurology.*

1. Introduction

Stroke remains one of the leading causes of mortality and long-term disability worldwide. According to the World Health Organization, millions of individuals suffer a stroke each year, with a significant proportion experiencing persistent neurological deficits. While motor impairments are often the primary focus of rehabilitation, cognitive dysfunction is increasingly recognized as a critical determinant of patient outcomes.

Post-stroke cognitive impairment (PSCI) encompasses a wide spectrum of cognitive deficits that arise following cerebral ischemia or hemorrhage. These deficits may manifest immediately after the acute event or develop gradually over time. Commonly affected domains include attention, memory, executive functioning, language, and visuospatial abilities. In severe cases, PSCI may progress to vascular dementia.

The pathophysiology of PSCI is complex and multifactorial. It involves direct neuronal damage caused by ischemia, disruption of neural networks, neuroinflammation, and secondary neurodegenerative processes. Lesion location plays a crucial role; for example, strokes affecting the frontal lobe often result in executive dysfunction, whereas temporal lobe involvement may impair memory.

Recent advances in neuroscience have highlighted the brain's capacity for neuroplasticity—the ability to reorganize and form new neural connections following injury. This

adaptive mechanism provides the foundation for neurorehabilitation strategies aimed at restoring cognitive function.

Despite growing awareness, PSCI remains underdiagnosed in clinical practice. Many patients do not receive adequate cognitive assessment or rehabilitation, leading to poor functional outcomes and increased caregiver burden. Therefore, there is a pressing need to develop effective, evidence-based interventions tailored to individual patient profiles.

The objective of this study is to investigate the impact of structured, individualized neurorehabilitation programs on cognitive recovery in post-stroke patients. By integrating clinical assessment, targeted therapy, and longitudinal follow-up, this research seeks to contribute to the optimization of stroke rehabilitation practices.

2. Methods

2.1 Study Design

This study was designed as a prospective observational cohort study conducted over a period of six months. The primary aim was to evaluate cognitive recovery in post-stroke patients undergoing individualized neurorehabilitation.

2.2 Participants

A total of 150 patients diagnosed with stroke were recruited from neurology departments and rehabilitation centers. Stroke diagnosis was confirmed באמצעות neuroimaging techniques, including computed tomography (CT) and magnetic resonance imaging (MRI).

Inclusion Criteria:

- Age between 40 and 75 years
- First-ever ischemic or hemorrhagic stroke
- Presence of cognitive impairment confirmed by screening tools
- Ability to provide informed consent

Exclusion Criteria:

- Pre-existing dementia or major psychiatric disorders
- Severe aphasia preventing cognitive assessment
- Comorbid conditions significantly affecting survival

2.3 Cognitive Assessment

Cognitive function was evaluated using standardized neuropsychological instruments, including:

- Mini-Mental State Examination (MMSE)
- Montreal Cognitive Assessment (MoCA)
- Trail Making Test (TMT)

Assessments were conducted at baseline, 3 months, and 6 months.

2.4 Rehabilitation Intervention

Each participant received an individualized rehabilitation program consisting of:

1. **Cognitive training:** memory exercises, attention tasks, problem-solving activities
2. **Physical therapy:** motor recovery and coordination improvement
3. **Speech therapy:** for patients with language deficits
4. **Psychological support:** counseling and stress management

Therapy sessions were conducted 3–5 times per week.

2.5 Outcome Measures

Primary outcomes included:

- Improvement in cognitive test scores
- Functional independence (measured by ADL scales)

Secondary outcomes included quality of life and emotional well-being.

2.6 Statistical Analysis

Data were analyzed using statistical software (SPSS).

- Continuous variables were expressed as mean ± standard deviation
- Paired t-tests were used to compare baseline and follow-up scores
- A p-value < 0.05 was considered statistically significant

2.7 Ethical Considerations

The study was conducted in accordance with ethical standards and approved by an institutional review board. All participants provided written informed consent prior to enrollment.

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