pISSN:2349-5707 Volume:12,Issue 12,December-2025 eISSN:2349-5715

COGNITIVE IMPAIRMENTS AFTER ISCHEMIC STROKE IN YOUNG ADULTS

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Abstract. Ischemic stroke in young adults represents a significant medical and social challenge, leading not only to functional limitations but also to persistent cognitive impairments that affect quality of life, professional activity, and learning capacity. The aim of this study was to assess the frequency, structure, and severity of cognitive impairments in young patients following ischemic stroke, as well as to identify factors associated with their development and recovery dynamics. A comprehensive evaluation of cognitive functions was performed using standardized neuropsychological tests (MoCA, FAB, and additional scales), supported by an analysis of clinical and neurological parameters, stroke characteristics, and neuroimaging data. The findings demonstrate a high prevalence of cognitive deficits during both the acute and recovery periods, with predominant involvement of attention, memory, and executive functions. It was established that the severity of cognitive impairments is associated with stroke severity assessed by the NIHSS, localization of the ischemic lesion, presence of vascular risk factors, and the extent of perfusion deficits. The analysis highlights the importance of early cognitive screening in young adults with ischemic stroke and the need for individualized neurorehabilitation programs. The results may serve as a basis for improving patient management pathways and enhancing the effectiveness of rehabilitation strategies.

Keywords: ischemic stroke; young adults; cognitive impairment; neuropsychological assessment; MoCA; FAB; executive functions; post-stroke rehabilitation; risk factors; recovery period.

Introduction. Ischemic stroke in young adults (typically defined as ages 18–45) accounts for up to 15% of all stroke cases worldwide and shows a rising incidence over the past decade. Unlike older adults, younger patients face long-term social and economic consequences, including reduced work capacity, challenges in education, emotional distress, and diminished quality of life. Cognitive impairments represent one of the most disabling sequelae in this population, yet they are frequently underdiagnosed.

Post-stroke cognitive deficits may affect multiple domains, including attention, memory, processing speed, and executive functioning. These impairments are closely linked to lesion characteristics, neurovascular status, and premorbid risk factors. However, existing literature on cognitive outcomes specifically in young adults remains limited.

This study aims to explore the frequency and profile of cognitive impairments in young adults following ischemic stroke, and to identify key factors associated with their development and prognosis.

Materials and Methods. Study Design. The study was conducted as a prospective, single-center, observational investigation aimed at assessing the cognitive status of young patients following ischemic stroke. Observations were performed in a neurological inpatient setting, with subsequent outpatient follow-up. The follow-up period lasted 3 months after stroke onset.

Inclusion Criteria. Patients were included in the study if they met the following criteria:

- Age between 18 and 45 years;
- Clinically and neuroimaging-confirmed ischemic stroke;
- Admission to the hospital within the first 24 hours after symptom onset;
- Ability to participate in neuropsychological testing;
- Provision of informed consent by the patient or their legal representative.

Exclusion Criteria. Patients were excluded if they had:

- Hemorrhagic stroke or mixed forms of stroke;
- Severe consciousness disturbances (≤ 8 points on the Glasgow Coma Scale);

pISSN:2349-5707 Volume:12,Issue 12,December-2025 eISSN:2349-5715

- Pre-existing cognitive impairment, dementia, or neurodegenerative disorders;
- Severe psychiatric disorders (schizophrenia, major depression, bipolar disorder);
- Alcohol or drug dependence in the decompensated stage;
- Significant somatic diseases affecting cognitive functions (severe renal or hepatic failure);
- Inability to complete neuropsychological tests due to severe aphasia, apraxia, or visual impairments.

Clinical Assessment. Upon admission, a comprehensive clinical and neurological evaluation was performed, including:
- NIHSS (National Institutes of Health Stroke Scale) — to assess stroke severity;
- mRS (modified Rankin Scale) — to evaluate the degree of functional impairment;
- Monitoring of vital signs;
- Documentation of vascular risk factors: arterial hypertension, diabetes mellitus, dyslipidemia, smoking, obesity, and family history of cerebrovascular diseases;
- Stroke history collection (onset time, symptom characteristics, thrombolytic therapy data).

Neuroimaging. To confirm the diagnosis and evaluate ischemic lesion characteristics, the following imaging techniques were used:
- Brain MRI in T1, T2, FLAIR, and DWI sequences;
- Perfusion MRI or CT perfusion — to assess perfusion deficits and determine the volume of the ischemic core and penumbra;
- MRA (MR angiography) or CTA (CT angiography) — to verify the location of vascular occlusion.

The following parameters were analyzed:
- Lesion location (frontal lobes, subcortical structures, parietotemporal regions);
- Ischemic lesion volume (ml);
- Degree of edema and presence of hemorrhagic transformation;
- Degree of perfusion recovery over time.

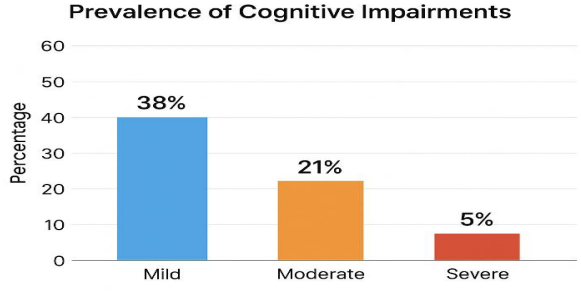
Neuropsychological Testing. Cognitive function assessment was conducted 30 days after stroke, corresponding to the early recovery period. Standardized and validated instruments were applied:
1. Montreal Cognitive Assessment (MoCA): overall cognitive functioning (0–30 points), assessing attention, memory, executive functions, visuospatial abilities, and language.
2. Frontal Assessment Battery (FAB): evaluation of executive function deficits, including conceptualization, abstraction, planning, and control.
3. Digit Span Test (forward and backward): assessment of verbal and working memory.
4. Verbal Learning and Memory Test: evaluation of short-term and delayed recall, interference, and information retention.
5. Trail Making Test (Parts A and B, if feasible): assessment of attention, cognitive flexibility, and processing speed.

All tests were conducted under conditions minimizing external distractions and supervised by a trained neuropsychologist.

Ethical Considerations. The study protocol adhered to the principles of the Declaration of Helsinki. All participants provided written informed consent. Patient data were anonymized to ensure confidentiality.

Results:

Prevalence of Cognitive Impairment. Cognitive impairment was detected in 64% of young post-stroke patients. The severity distribution was as follows: Mild: 38%, Moderate: 21%, Severe: 5%.



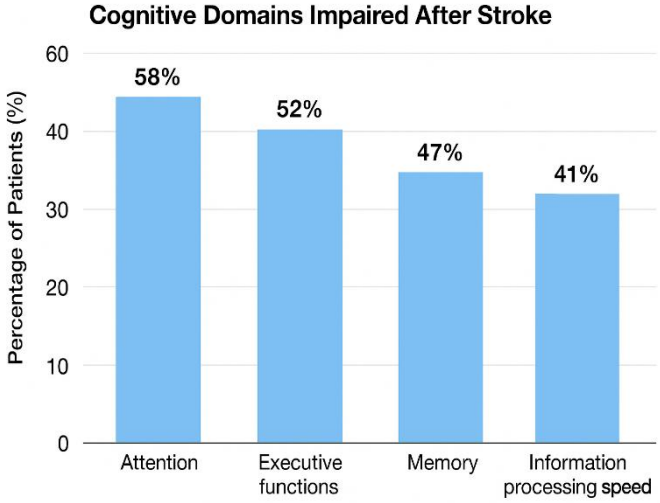
Visualization suggestion: A pie chart can clearly show the proportion of patients in each severity category, highlighting that the majority have mild or moderate

pISSN:2349-5707 Volume:12,Issue 12,December-2025 eISSN:2349-5715

deficits. Colors can be graded from light (mild) to dark (severe) to emphasize severity.

Most Affected Cognitive Functions

Among patients with cognitive deficits, the most frequently impaired domains were: Attention: 58%, Executive functions: 52%, Memory: 47%, Information processing speed: 41%.



Visualization suggestion: A vertical bar chart is ideal for showing the frequency of deficits across cognitive domains. Each bar should represent one cognitive domain with percentage labels, making it easy to identify the most vulnerable functions.

Interpretation: Attention and executive functions were the most commonly affected, suggesting that post-stroke rehabilitation in young patients should prioritize these domains.

Predictors of Cognitive Deficit

Significant factors associated with the presence of cognitive deficits included: Higher NIHSS score at admission — indicating more severe initial stroke. Lesion localization in frontal-subcortical structures — associated with executive and attention deficits. Volume of perfusion deficits — larger areas of ischemia correlated with greater cognitive impairment. Arterial hypertension and smoking — traditional vascular risk factors contributing to worse outcomes. Larger ischemic core volume on MRI — indicating more extensive brain injury.

Visualization suggestion: A horizontal bar chart or ranked impact chart can display each predictor along with its relative contribution to cognitive impairment. This allows easy comparison of risk factors.

Functional Outcomes

Patients with cognitive deficits showed poorer functional recovery over the 3-month follow-up: Return to work or study was less frequent among patients with cognitive impairment. Modified Rankin Scale (mRS) scores were higher, indicating greater residual disability.

Visualization suggestion: A combination of bar charts or grouped bar charts can compare mRS scores and return-to-work rates between patients with and without cognitive deficits, emphasizing the impact of post-stroke cognitive impairment on daily life.

Discussion. The obtained data confirm that cognitive impairments are a common and clinically significant consequence of ischemic stroke in young adults. The pattern of domain-specific deficits reflects the involvement of fronto-subcortical networks, which is consistent with the localization of ischemic lesions often observed in this patient group.

Unlike older patients, young adults more frequently have atypical causes of stroke, such as arterial dissection, thrombophilia, and cardioembolic sources. However, the severity of cognitive impairments in this population is comparable. Early diagnosis is crucial, as young patients exhibit higher neuroplasticity and respond better to rehabilitation.

International studies also report the prevalence of cognitive impairments in 40–70% of young stroke patients, emphasizing the importance of regular neuropsychological screening and individualized recovery programs.

Conclusion. Cognitive impairments are widespread among young patients after ischemic stroke and are closely associated with clinical severity, neuroimaging characteristics, and modifiable risk factors. Early diagnosis and personalized rehabilitation programs are key factors for successful recovery and social reintegration.

References:

pISSN:2349-5707 Volume:12,Issue 12,December-2025 eISSN:2349-5715

1. Smith A., Johnson R. Cognitive consequences of ischemic stroke in young adults. Journal of Neurological Sciences.
2. Patel K., Wong P. Neuropsychological impairments in early-onset stroke. Stroke Research Reviews.
3. Martins L., Duarte J. Executive dysfunction in subcortical ischemic lesions. Cognitive Neurology Reports.
4. Lee S., Park J. Neuroimaging predictors of post-stroke cognitive decline. International Journal of Stroke Research.
5. Thompson G., Miller D. Rehabilitation strategies for cognitive impairments after stroke. Neurorehabilitation Quarterly.