

**Niyazov Shuhrat Toshtemirovich**

Doctor of Medical Sciences, Associate Professor, Department of Neurology  
*Samarkand State Medical University, Republic of Uzbekistan*

**Rashidova Sevarahon Istamovna**

Free applicant departments of neurology  
*Samarkand State Medical University, Republic of Uzbekistan*

## FUNCTIONAL AND MICROSTRUCTURAL NEUROVISUALIZATION IN NEUROVASCULAR PATHOLOGY IN ADOLESCENTS

**The aim of the study** is to study and identify the clinical and neuroimaging features of neurovascular pathology in adolescents in order to early verify functional vascular disorders.

**Research material and method.** The study was conducted at the Multidisciplinary Clinic of Samarkand State Medical University in the departments of pediatric neurology, general neurology, and therapeutic units between 2024 and 2025. The study included adolescents aged 16 to 19. The main group consisted of 33 patients with clinically verified neurovascular pathology (100%). The control group consisted of 31 practically healthy adolescents of comparable age and gender who underwent a preventive examination at the SamSMU MC polyclinic. In the main group, girls accounted for 18 people (54.5%), while boys accounted for 15 people (45.5%). In the control group, there were 16 girls (51.6%) and 15 boys (48.4%). The gender distribution did not differ statistically ( $p > 0.05$ ), and the percentage difference between the groups did not exceed 2.9%. Age structure of the main group: 16 and 17 years - 14 patients (42.4%); 18 and 19 years - 19 patients (57.6%). In the control group, 16 and 17 years, 13 people (41.9%); 18 and 19 years - 18 people (58.1%). No differences in age stratification were identified between the groups ( $p > 0.05$ ); the percentage difference was less than 1%. Distribution by type of neurovascular pathology in the main group (ICD-10) was as follows: secondary neurovascular conditions against the background of arterial hypertension (I10–I15) accounted for 15 patients (45.5%); congenital cerebral vascular anomalies (Q28.0–Q28.3) accounted for 9 patients (27.3%); and patients with other cerebrovascular diseases (I67) accounted for 9 patients (27.3%). Thus, the hypertensive-associated variant among patients was found 18.2% more frequently than each of the other variants of the pathology. The average duration of clinical manifestations in the main group was  $2.3 \pm 0.8$  years. In 19 adolescents (57.6%), the duration of symptoms exceeded 2 years, which is 57.6% longer compared to the control group, where there

were no chronic neurological symptoms. The sampling was conducted taking into account inclusion and exclusion criteria, which ensure group comparability and the reliability of clinical and neuroimaging analysis. Clinical examination was conducted in all adolescents of the primary and control groups and included a detailed clinical-neurological examination with an assessment of complaints, neurological status, the nature of cephalic syndrome, autonomic manifestations, coordination and sensory impairments, as well as signs of astheno-neurosis. Particular attention was paid to the duration of symptoms, trigger factors, family history of vascular pathology, and the presence of arterial hypertension. Neuroimaging research was performed on adolescents in the primary group at the Multidisciplinary Clinic of Samarkand State Medical University in the Department of Radiology and Radiology, as well as at private diagnostic centers in the city of Samarkand—"MedExpert" and "Miroz."

**RESEARCH RESULTS:** The result of clinical and neurological analysis showed that neurovascular pathology in patients aged 16 and 19 years is primarily formed as a functional-regulatory syndrome with a combination of general cerebral, vegetative, and cognitive manifestations. In the main group (n=33), headache was noted in 26 patients (78.8%), which was 59.4% higher than in the control group (19.4%;  $p<0.001$ ). Dizziness was recorded in 60.6% of patients in the main group, compared to 9.7% in the control group, where the difference was 50.9% ( $p<0.001$ ). At the same time, increased fatigue was observed in 72.7% of patients with a difference of 46.9% ( $p<0.001$ ), and a decrease in attention was noted in 66.7% with a difference of 50.6% ( $p<0.001$ ). The level of stratification in the age aspect of patients showed an increase in symptoms in the older age category from 18 to 19 years (n=19), headache was recorded in 84.2% of patients, compared to 71.4% of patients aged 16 and 17 years (n=14), where the difference corresponds to 12.8% ( $p=0.18$ ). The fatigue indicator in the main group of patients was found in 78.9% of elderly patients, while in 64.3% of younger patients, the difference was 14.6% ( $p=0.16$ ). Although the differences did not reach strict statistical significance, there was a tendency for functional manifestations to increase with age, associated with an increase in cognitive and psycho-emotional stress.

The combined model (CBF and FA) demonstrates higher diagnostic accuracy compared to each of the indicators individually, reflecting the advantage of integrating hemodynamic and microstructural markers in the early verification of functional vascular disorders in patients.

**CONCLUSIONS:** Neurovascular pathology in patients aged 16 and 19 manifests primarily as a functional-regulatory clinical syndrome with a predominance of cephalic, vestibulo-asthenic, and cognitive components, which

are more pronounced in the hypertensive-associated variant of the disease and in the older age group.

### References:

1. Rakhimov A.A., Mamatova Sh.A. Clinical features of cerebrovascular disorders in adolescents. *Medical Journal of Uzbekistan*. 2023; 4:45–50.
2. Yuldashev N.M., Tashpulatov B.B. The role of magnetic resonance imaging in diagnosing cerebral vascular pathology in young individuals. *Bulletin of the Tashkent Medical Academy*. 2022;2:78–83.
3. Alsop D.C., Detre J.A., Golay X., et al. Recommended implementation of arterial spin-labeled perfusion MRI for clinical applications: a consensus of the ISMRM Perfusion Study Group and the European ASL Consortium. *Magnetic resonance in medicine*. 2015;73 (1): 102–116.
4. Haller S., Haacke E.M., Thurnher M.M., et al. Susceptibility-weighted imaging: technical essentials and clinical neurologic applications. *Radiology*. 2021;299 (1):3–26.
5. Lebel C., Deoni S. The development of brain white matter microstructure. *NeuroImage*. 2018; 182:207-218.
6. Mandell D.M., Mossa-Basha M., Qiao Y., et al. Intracranial vessel wall MRI: principles and expert consensus recommendations. *American Journal of Neuroradiology*. 2017;38 (2):218–229.