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# COGNITIVE IMPAIRMENT IN MULTIPLE SCLEROSIS

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**Abstract.** Multiple sclerosis is the most common demyelinating disease of the central nervous system. Recently, there has been an increase in the frequency of its cases in many countries, including Uzbekistan. It has been revealed that the risk of developing PC is significantly influenced by belonging to a particular race and ethnic group, as well as place of residence[1]. In the world, PC is the most common among the white population of the globe. It is noteworthy that among representatives of the white race who live in southern latitudes, the prevalence of PC is significantly lower compared to North America or Europe. In Russia, in the Republic of Dagestan in 2006, there were 9.4 cases per 100,000 population. In the pathogenesis of multiple sclerosis, both an autoimmune pathological process and a neurodegenerative one play a role, which causes early damage to axons - together this leads to irreversible disability in MS. In about 1/2 of patients, cognitive disorders can be detected by neuropsychological testing at the beginning of the disease. At the same time, the patients themselves do not make any complaints or note only increased "mental fatigue". But after 3 years of the disease, 20% of patients have significant disorders in this area, up to the development of dementia in some cases. [2]

The aim of the study was to study the parameters of neuropsychological testing, cognitive evoked potential, as well as to assess the clinical significance of brain atrophy in MS

**Materials and methods**. A total of 65 patients with a reliable diagnosis of MS were examined. The age of the patients ranged from 18 to 57 years, with an average of 36.6±1.0 years. In 40 patients, a relapsing type of multiple sclerosis (MS) was established, in 25 — a secondary progressive course (SPMS). The mean age of patients with RMS was 34.5±1.3 years with an average duration of the disease. The mean age of patients with PPS was 40.8±1.4 years, while the average duration of the disease was 13.8± 1.3 years. The total assessment of neurological deficit was carried out using the Expanded Disability Status Scale (EDSS), the severity of the condition ranged from 1 to 7.0 points, the average score was 3.8±1.6. In the group of patients with RMS, it reached 2.9±1.6 points, and in patients with PPMS, it was 5.4±1.0 points. The overall severity of cognitive impairment was assessed using the summary scores of the main screening neuropsychological tests: the Brief Mental State Assessment Scale (MMSE), the Frontal Dysfunction Assessment Battery (FAB). Mnestic disorders were assessed according to the test of memorization and reproduction of 10 words according to the method of A.R. Luria. Short-term visual memory, attention, mental performance, and information processing speed were studied using the test of numerical and symbolic modalities, Schulte tables. The neurophysiological examination was carried out according to the generally accepted method of cognitive evoked potentials R-300 [3] on the Neuron-Spectrum 4VP computer electroencephalograph. The study was carried out in a situation of a randomly occurring event (in response to auditory non-verbal stimulation). The stimulation parameters were as follows: binaural, stimulus duration — 50 ms, intensity 80 dB, the period between stimuli is 1 s, tone frequency is 2000 Hz for a significant stimulus, 1000 Hz for an insignificant stimulus. In order to study the higher mental functions, 71 patients underwent magnetic resonance imaging (MRI) of the brain. To diagnose internal cerebral atrophy, linear measurement of the transverse dimensions of the anterior horns, bodies and posterior horns of

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the lateral ventricles was used. To determine the degree of external cerebral atrophy, the average width of the four maximal cortical sulci was measured.

Such disorders in the examined sample of patients were found in 71.6% of cases (in more than 2/3 of patients). In terms of the frequency of detection, cognitive disorders were comparable to motor disorders (69.7%), exceeded the frequency of sensory (62.4%), coordination (58.7%), and pelvic disorders (53.2%). When analyzing the state of cognitive functions according to the MMSE scale in the general group of MS patients, cognitive disorders were noted in 71.6% of cases. Moderate cognitive impairment was observed in 65.4% of patients, mild dementia in 32.0% of patients, and moderate dementia was diagnosed in 2.6% of cases. Against the background of a general deterioration in neurocognitive function in MS, frontal dysfunction (28.5%) was revealed, which was expressed in impaired executive functions — planning, switching, generalization. The leading and most serious impairments were a decrease in the speed of information processing and a violation of the ability to store and simultaneously manipulate visual-spatial information in working memory for a short time. Thus, these violations were detected according to the test of numerical and symbolic modalities in 70.6% of cases, according to the Schulte table — in 69.7-72.5%. One of the most common in the studied group of patients with MS was memory disorders, which consisted of the following components: narrowing of the volume of direct memorization, increased influence of interfering activity on reproduction. Impaired direct reproduction according to the test for memorizing 10 words according to A.R. Luria was revealed in 43.1% of cases. At the same time, it is noteworthy that, in contrast to direct memory, an increased sensitivity of the memory trace to interference was noted to a greater extent in patients with MS (53.2%). Memory impairment was modal-nonspecific and manifested itself in auditory and visual memory disorders. The dominant characteristic of cognitive impairment in MS patients was also attention disorder (68.0%). It manifested itself both in the auditory and visual spheres and was characterized by problems of stability, sensitivity to distractions. Analysis of the results obtained in the study of cognitive status in different types of MS has revealed certain patterns. First of all, a comparative assessment of the quantitative indicators of most neuropsychological tests between subgroups of patients with RMS and SPMS showed significant differences between them. The cognitive functions of patients with RMS were significantly more preserved than in patients with SPMS. Analysis of the results of neuropsychological testing also revealed a number of differences in the structure of cognitive impairment in these types of MS. In SPMS, such functions as short-term memory, attention, information processing speed, fluency, the ability to generalize the proposed material, and visuospatial abilities were most severely impaired. Characteristic of the relapsing type of MS were a milder decrease in the speed of information processing, memory, active attention, and speech. In general, patients with RMS were characterized by impaired ability to generalize and visuospatial disorders.

**Outcomes.**

The most typical for RMS was the development of mild cerebral atrophy, less often moderate and severe atrophy occurred. In secondary progression, atrophic processes in the brain were most common, and mild to moderate atrophy of brain tissue was more common with approximately equal frequency. A correlation has been established between diffuse brain atrophy and cognitive impairment in MS. Thus, in the group of MS patients, there was a direct correlation between the speed of information processing, attention span, working memory (Schulte's test) and the size of the body of the lateral ventricle ($r=0.328$, $p=0.006$), the size of the anterior horn of the lateral ventricle ($r=0.357$, $p=0.002$). An inverse correlation was established between the size of the anterior horn of the lateral ventricle and

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frontal dysfunction of FAB (r= –0.244, p=0.04), with the volume of short-term memory with delayed reproduction of 10 words (r= –0.458, p=0.003).

**Discussion**

Cognitive impairment in multiple sclerosis has traditionally received insufficient attention, although they are diverse and common. At present, the attitude towards these manifestations of the demyelinating and neurodegenerative process in MS has changed significantly. [4] Neuropsychological disorders found in multiple sclerosis are one of the important components in the formation of the clinical picture of the disease. Based on previous studies, the main symptoms of cognitive disorders in multiple sclerosis were identified, and drugs that can provide palliative care to the patient and slow down the pathological process were recommended. Early diagnosis and timely assistance are the basis for successful treatment of this disease.

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