Abstract.

Objective of this study was to study the features of the higher cerebral functions associated with vascular brain disease. The study included 75 patients aged 51-75 years with chronic cerebral ischemia. Neuropsychological examination was conducted, including an assessment of the emotional sphere and psychological status before and after therapeutic correction. Impairments of memory were detected in 96.0% of patients, attention - 90.0%, somatosensory gnosis - 81.3%, intelligence - 73.3%, acoustic gnosis - 64%, speech - 57.3%, ocular gnosis - 56, 0%, dynamic praxis - 49.3%, writing - 14.7%, counting - 14.7%, and reading 9.3%. The "memorizing emotional words" test showed the significance of the emotional factor: the highest memorizing rate was in emotional words 3.3±0.3, as compared with neutral words 2.6±0.2.

Holmes and Ray test revealed a stress level of 160±11.64. The effectiveness of pharmacological and psychological correction was shown in a decrease in the number of patients in terms of higher brain activity, as well as a decrease in the importance of the emotional factor was revealed as the growing remembering ability for neutral words; prior to treatment - 2.6±0.2, and post treatment - 3.1±0.2.

The study of 51-75-year-old patients showed the greatest changes in the memory, attention, somatosensory gnosis, intelligence, and acoustic gnosis. The decreasing significance of the emotional factor, taking into account the importance of the psychological status using pharmacological and psychological treatment, improves the higher brain functions.

This paper deals with in the impairments of higher brain functions associated with chronic cerebral ischemia. The analysis of changes in higher brain functions in patients aged 51-75 years has been conducted, the emotional sphere...
has been studied, and the psychological status has been assessed. The most common changes in the spheres of memory, attention, somatosensory gnosis, intelligence, and acoustic gnosis have been identified. The importance of the emotional factor, as well as the presence of the stress load in the studied group of patients has been shown.

Upon completion of the course of pharmacological and psychological treatment, the positive dynamics was admitted in the field of higher brain function, as well as increased cognitive capacity and reduced importance of the emotional factor in the evaluation of the emotional sphere, which has consequently improved the quality of life of patients.

**Keywords:** Cognitive disorders, brain, higher brain functions, emotional sphere.

**Introduction.**

The impairments of cognitive functions, associated with cerebrovascular diseases [11], cause deadaptation in all aspects of life [6]. Cerebrovascular diseases are one of the most common causes of cognitive impairment [14] in the elderly. Diagnosis of vascular cognitive impairments [12] is based primarily on the identification of disorders of higher brain functions.

In most patients, the personal and cognitive impairments occur most early [1] and are the factors that prevent social their adaptation and contribute to the reduction in quality of life [2]. Emotional and personality disorders manifest themselves as irritability, emotional lability, anxiety, and depression [9]. Features of the psychological status of patients suffering from cognitive impairment of vascular origin should be studied for the purpose of their therapy correction.

A set of measurements, evaluating the clinical and psychological status of the patient, ensures timely identification of cognitive impairment and determination of the appropriate methods of treatment, which can combine the pharmacological and psychological correction. In this regard, it is necessary as soon as possible to establish the presence of cognitive impairments, as well as to clarify their nature and genesis [5].

**Materials and Methods.**

The study involved 75 patients aged 51-75 years, 21 of them (28.0%) were men and 54 (72.0%) - women with a cerebrovascular disease [10]. All patients gave their consent to a personal examination. The study was conducted in compliance with all ethical standards, taking into account the features and individuality of the higher brain functions. The study group included patients with chronic brain ischemia, with the appropriate degree of vascular encephalopathy II. The cerebrovascular disease has been confirmed by paraclinical methods of examination: the magnetic resonance imaging of the brain, and the color duplex scanning of the carotid and vertebral arteries have
The higher brain functions have been studied with the subsequent analysis of the results. Inclusion criteria were the age of 51-75 years, absence of dementia and severe physical illness. A neuropsychological evaluation [7] of all higher brain functions has been applied using the following tests: attention - assessment of skin and kinesthetic senses (Förster test), acoustic gnosis - assessment of rhythm, dynamic praxis - choice reaction (to make some movement for a certain sound), speech - reflection, writing - to write 2-3 sentences on a given topic, reading - unfamiliar words, memory - to remember the series of numbers, counting - triple count test, and intelligence - to solve logical problems.

Emotional sphere was studied with the use of the "memorizing emotional words" test, and the number of the presented 10 emotional and 10 neutral words was further assessed [8].

In order to study the psychological status, the method of stress resistance and social adaptation of Holmes and Ray was applied [4] to assess the degree of stress resistance. Neuropsychological study with the assessment of emotional sphere was conducted prior to and post pharmacological and psychological correction [13]. Pharmacological correction included vasoactive, neurometabolics, and antioxidants.

Subject to the indications, patients received antidepressants and tranquilizers. The process of psychological correction involved auto-training, and some patients received behavioral therapy. Statistical processing was performed with the SPSS 12.0 for Windows. We used Student's t-test to evaluate intergroup differences, McNemar's test to compare indicators before and after treatment in the same group, and Pearson's chi-squared test to compare the results of unrelated groups.

**Results.**

The results of the study of higher brain functions revealed changes in memory - 96% of patients, attention - 90%, somatosensory gnosis - 81.3%, intelligence - 73.3%, acoustic gnosis - 64.0%, speech - 57.3%, ocular gnosis - 56.0%, dynamic praxis - 49.3%, writing - 14.7%, counting - 14.7%, and reading 9.3%. The greatest changes were in memory, attention, somatosensory gnosis, intelligence, and acoustic gnosis.

Emotional sphere has been assessed with the “memorizing emotional words" test: emotional words were 3.3±0.13, and neutral words 2.6±0.2, which indicates a prevalence of emotional factors (emotional words are the most memorizable). The investigation of psychological status in patients with cognitive impairment of vascular genesis was carried out using Holmes and Ray test. The level of the stress load in the studied group of patients was 160.3±11.64, the relevant data are shown in Fig. 1.
Баллы – scores

Низкий уровень стресса – lowstresslevel

Риск развития стресса 50% - stressrisk 50%

Риск развития стресса 90% - stressrisk 90%

Figure 1. Holmes and Ray test results of the studied group of patients.

The cerebrovascular disease has been confirmed by paraclinical methods of examination. Magnetic resonance imaging revealed microangiopathic brain changes in 64.0% of patients, cysts in 6.7% of patients, 4% of patients had atrophic changes. 25.3% of patients had no changes revealed during magnetic resonance tomography of the brain, however, they were found to have neurological symptoms, as well as changes in the carotid and vertebral arteries.

Color duplex scanning of the carotid and vertebral arteries identified stenosis in 57.3% of patients, and 78.7% of patients had macroangiopathic changes in carotid and vertebral arteries. The changes were revealed in all areas of higher brain activity after the conducted therapy. Data are shown in Table 1.

Table 1. Changes in the areas of higher brain activity both before and after the conducted therapy.

<table>
<thead>
<tr>
<th>Areas of higher brain activity</th>
<th>Number of patients, abs. (%)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>prior to treatment</td>
<td>post treatment</td>
</tr>
<tr>
<td>memory</td>
<td>96</td>
<td>49.3</td>
</tr>
<tr>
<td>attention</td>
<td>90</td>
<td>46.3</td>
</tr>
<tr>
<td>somatosensory gnosis</td>
<td>81.3</td>
<td>22.7</td>
</tr>
</tbody>
</table>
The most common changes in the areas of higher brain activity revealed both before and after the conducted therapy respond to therapeutic correction. Data are shown in Fig. 2.
The number of the remembered emotional words after the conducted therapeutic correction remained the same (3.3±0.14), the number of the remembered neutral words increased - 3.1±0.2, p<0.001. This indicates a decrease in the significance of the emotional factor. Data obtained from the conducted examination are shown in Fig.3

Смешение – prior to treatment
Последующие – post treatment
Нейтральные слова – neutral words
Эмоциональные слова – emotional words

Figure 3. Pre- and post-treatment emotional sphere.

Summary. 1. The study of higher brain functions in patients aged 51-75 years with chronic ischemia of the brain has revealed changes in all aspects of higher brain activity with the predominantly impaired memory, attention, somatosensory gnosis, intelligence, and acoustic gnosis. The findings show the changes in the cognitive sphere (memory, attention, intelligence) with the significance of both somatosensory and auditory gnosis.

2. The evaluation of emotionally personal sphere of patients with vascular cognitive impairments has revealed the significance of the emotional sphere - the predominant memorization of emotional words as compared to neutral words. A reduced ability to remember neutral and emotional words indicates a decline in cognitive potential. The investigation of psychological status of patients revealed the presence of stress level (160.3±11.64), which makes 50% probability of occurrence of serious health problems, and indicates the presence of a stress load.

3. The study of the clinical and psychological status, including an assessment of the areas of higher brain function, emotional-personal sphere, features of the psychological status of patients with cognitive impairment on the background of cerebrovascular diseases before and after treatment, ensures development of a set of actions [14]
involving both pharmacological and psychological correction, which will improve the cerebrovascular disease prognosis.

**Conclusion.** Early diagnosis of changes in the cognitive sphere (memory, attention, intelligence), as well as in the somatosensory and acoustic gnosis in patients with chronic ischemia of brain with further assessment of the emotional sphere and psychological status will allow for a complex therapy contributing to the improvement of the quality of life.

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**References**


