



The Efficiency of Neurotrophic Therapy with Cerebrolysin in Ischemic Stroke

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Abstract: 54 patients were examined with ischemic stroke in the early recovery period. They were undergone clinic-instrumental and neuropsychologic examination. In comparison with Cerebrolysin at the dose of 20 ml and 30 ml, 30 ml dose of Cerebrolysin effected positively to intellectual-mnemonic disorders, by developing its neuroprotective action. In addition, at this dose of drug, brain bioelectrical activity were improved faster in EEG.

Keywords: ischemic stroke, Cerebrolysin, EEG, neuroprotection, neuropsychologic examination.

Relevance. The problem of post-stroke cognitive impairment (PCI) is currently the subject of research by many scientists, since it is relevant for almost all countries of the world. The prevalence of stroke and dementia continues to rise. There are currently 47.8 million people with dementia in the world. Its prevalence is expected to double every 20 years. It is estimated that by 2030 the number of patients with dementia will increase to 75 million, and by 2050 to 131 million; of these, 70% will be from low- and middle-income countries. PCI is any cognitive disorder that has a temporal association with stroke. Early PCI are detected in the first 3 months after a stroke, late PCI - in the period from 3 months to 1 year, but no later than a year after the onset of a stroke. The later cognitive impairments are detected after a stroke, the less clear their direct relationship with stroke becomes. In 16-60% of patients within a year after a stroke, cognitive impairment occurs. As early as 6 months after a stroke, PCI of varying severity is detected in almost half of patients [1,2].

Taking into account the concept of "therapeutic window", the delay of irreversible brain damage in acute vascular accident has been proven. In ischemic stroke, early administration of neuroprotectors in combination with reperfusion allows one to expect a greater effect from therapy [4,9]. Residual effects after a stroke are detected in about 2/3 of patients, of which 50% have cognitive impairments that limit social adaptation, including work and self-service at home, even in the absence of significant motor impairments [5,8]. The most common are mild and moderate CI, in most cases amenable to correction and recovery with the timely appointment of appropriate therapy [3,9]. Of great importance in drug therapy in patients who have had a stroke is neuroprotection, which can be carried out at any stage of medical care for patients with acute cerebrovascular accident.

Qualitative diagnostics of cognitive disorders should include neuropsychological research, since the first manifestations of this disease are psycho-emotional disorders and the most disabling consequences are associated with higher mental disorders. And therefore, in the therapeutic correction of ischemic stroke, neuroprotective drugs are of great importance.

Purpose of the study. To analyze the therapeutic efficacy of Cerebrolysin, depending on its dose, in motor and cognitive disorders in patients with ischemic stroke.

Materials and research methods. Neuropsychological studies assessing attention, memory, mental performance, and fluency were used to assess cognitive functions. For this, the MMSE test and special tests were used, such as the visual memory test, the Bourdon test, the speech activity test, the clock drawing test. Monitoring of the bioelectrical activity of the brain in all patients was carried out using a 16-channel computer electroencephalograph.

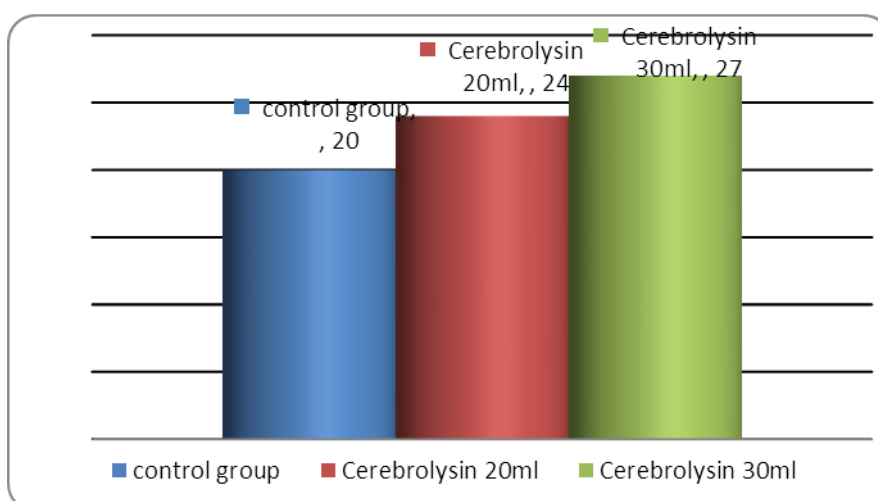
The study was conducted in a multidisciplinary Bukhara regional hospital in the department of neurology for 6 months. All patients underwent a comprehensive clinical and instrumental examination. The main group consisted of 54 patients with ischemic stroke (IS) aged 45-70 years (mean age 61 years). Of these, 28 patients received Cerebrolysin 30 ml per 150.0 ml of saline and 26 patients received Cerebrolysin 20 ml per 100.0 ml of saline for 2 weeks, but the dynamics of the disease was observed within 2 months. The control group consisted of 45 patients with IS of the same age who received standard therapy.

Results and discussions. Most often, patients of the main and control groups complained of headache, dizziness, memory loss, increased fatigue, irritability, and emotional lability.

Most patients of the main group had cognitive impairments of varying severity, 55% of patients had ataxia, hypokinesia was observed in 23% of patients, non-severe pyramidal disorders in 51%, pseudobulbar disorders were observed in 22% of patients.

Objective criteria for evaluating the effect of Cerebrolysin on cerebral cognitive functions were the data of neuropsychological control studies indicating an increase in the activity of mental processes in patients after treatment with Cerebrolysin. A mini-study of the mental state using the MMSE test, which makes it possible to judge such cognitive functions as perception, orientation, attention, counting, memory, speech, reading and writing, revealed an initially low level of preservation of cognitive functions before treatment. The average score equal to 19 before treatment increased to 27, approaching the maximum (30 points) in the treatment with Cerebrolysin at doses of 30 ml. When treated with Cerebrolysin at a dose of 20 ml, the test results increased to 24 points. The indicators of the control group have an average score of 20 (Pic. 1).

Pic. 1. The results of the MMSE test of the subjects within two months, depending on the dose of Cerebrolysin, compared with the control group.



All patients underwent electroencephalography (EEG). EEG was assessed at the time of inclusion in the study, i.e. before treatment, after the end of treatment with Cerebrolysin in doses of 20 ml and 30 ml after 2 months. Quantitative EEG data during treatment with Cerebrolysin were compared with data from the control group receiving standard therapy. Analysis of the quantitative EEG revealed significant long-term improvements in frequency and a significant decrease in the power ratio in patients with IS, and they were most pronounced after 2 months. The dynamics of EEG parameters

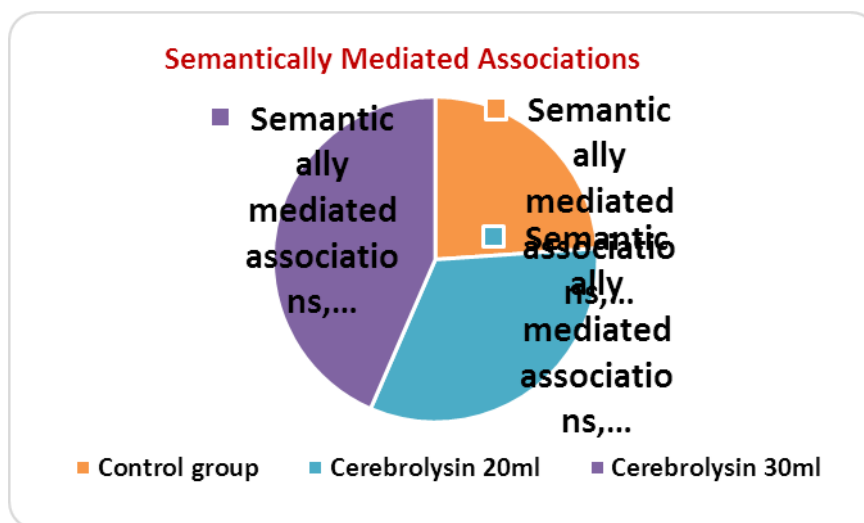
during treatment was expressed as a reduction in slow-wave activity, consolidation and increase in the alpha index, an increase in the amplitude of the alpha rhythm, against the background of a decrease in diencephalic stem disorders. In patients receiving Cerebrolysin at doses of 30 ml intravenously in 150.0 ml of saline, an improvement in the bioelectrical activity of the brain was observed after 1 month of treatment and did not depend on the severity of the disease than Cerebrolysin at doses of 20 ml. With Cerebrolysin in doses of 20 ml, improvement in the bioelectrical activity of the brain was observed slowly, after 2 months.

In patients before treatment, in the general structure of the EEG, the intensity in the range of theta and delta rhythms in the main group was 30.6%, alpha rhythm - 69.4%. After a course of treatment with Cerebrolysin at a dose of 20 ml, a shift in intensity towards the alpha rhythm (74.4%) and a decrease in the intensity of slow rhythms (delta and theta, respectively, 25.6%) were noted. These changes were noted after 2 months. In the treatment with Cerebrolysin in doses of 30 ml, a shift in intensity towards the alpha rhythm (83.6%) and a decrease in the intensity of slow rhythms (delta and theta, respectively, 16.4%) were noted. These changes were noted after the 1st month. The shift in the intensity structure of the main EEG rhythms in the control group is not statistically significant (Table 1).

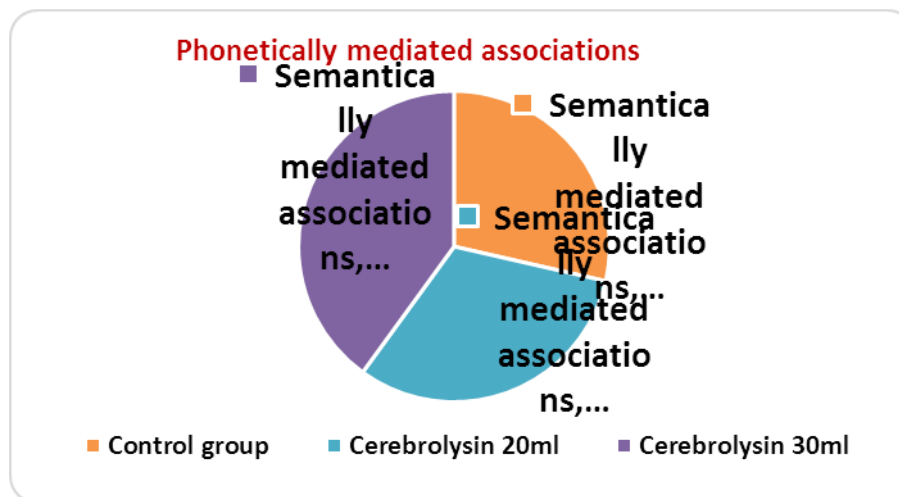
Table 1. Dynamics of indicators of bioelectrical activity in patients on the background of treatment with Cerebrolysin.

Indicators		Main group		Control group
		Cerebrolysin 20 ml	Cerebrolysin 30 ml	
Index of slow wave activity, %	Before treatment	30,6%	30,6%	30,6%
	After treatment	25,6%	16,4%	28,2%
Alpha-index, %	Before treatment	69,4%	69,4%	69,4%
	After treatment	74,4%	83,6%	71,8%

To determine severe cognitive dysfunction, a test for speech activity was studied. Thanks to this test, semantically and phonetically mediated associations were determined. In patients with IS, the number of phonetically mediated associations decreases faster than the number of semantically mediated associations. So, before treatment, patients named 9 phonetically mediated associations and 10 semantically mediated associations, after treatment this number increased to 14 phonetically mediated associations and up to 20 semantically mediated associations. These changes were clearly visible in patients receiving Cerebrolysin at doses of 30 ml (Pic. 2, 3).



Pic. 2. Results of the test for speech activity after treatment with Cerebrolysin at different doses



Pic. 3. Results of the test for speech activity after treatment with Cerebrolysin at different doses

Conclusions

1. The use of Cerebrolysin in patients with ischemic stroke is pathogenetically justified and is expressed as a dynamic effect in the shortest possible time of treatment. These changes are especially visible when using Cerebrolysin in doses of 30 ml.
2. Cerebrolysin in doses of 30 ml has a positive effect on intellectual-mnemonic disorders, significantly affects the dynamic indicators of the cognitive sphere (memory, perception, mental performance, etc.).
3. Indicators of bioelectrical activity of the brain according to EEG during Cerebrolysin therapy indicate a decrease in diffuse cerebral disorders. Cerebrolysin at doses of 30 ml has a pronounced multimodal property, has a rapidly developing neuroprotective effect, which allows us to recommend its use for the therapeutic correction of both neuropsychological and motor disorders in patients with ischemic stroke.

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