The Kinesiotherapy Method In Medical and Conductive Rehabilitation of Patients With Motor and Cognitive Deficits: Re-Integration of Motor-Cognitive Interactions

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The nervous system disorders and mental impairments still remain to be among the main causes of children and adults incapacity. To perform a movement, you need a smooth interaction of various complex automatic systems of neural control. Each response is a result of a complex information processing, and coordinative participation of various integrated levels.

Neurorehabilitation, currently, has a particular relevance and importance among people suffering from nervous system disorders, incapable of moving independently, self-care, performing socially important work that provides satisfaction and self-esteem, emotional balance and wealth.

In the rehabilitation context, there has to be an integrated, pathogenetically valid comprehensive rehab method developed for such patients. The method should allow for restoration of motor and cognitive functions and reaching the level of patients' independent performance of their daily routine as well for developing an adequate and intuitive response to changing environment.

The rehabilitation process of neurological patients with motor and cognitive impairments is associated with a big difficulty in reaching social and functional aspects. Therefore, it is important to choose the correct methods of physical rehabilitation with temporal and spatial summation of impulses that can be attained by special techniques of proprioceptive stimulation, perceptible by CNS.

Human memory is known to store mainly active movements performed by the person, therefore any pathological movement establishes a pathological motor stereotype which is hard to break via regular physical and physiotherapy or massages.

Benefiting from the foreign experience, Russia has developed a kynesi-therapeutical method and a pressure-suit called "Atlant" for medico-conductive rehabilitation of neurological patients with motor and cognitive impairments. The method is based on Ch. Sherrington's, G. Kabat's, I. Pavlov's, and I. Sechenov's studies. The rehabilitation pressure-suit (RPS) "Atlant" is developed based on the integrated motor act principle providing the evolutionally-developed stimuli, by launching which we can positively effect the structural and functional reformation of the nervous system and activate sanogenesis.

The RPS “Atlant” is developed as a modification and improvement of altitude compensation suit ACS-6, used in aviation to protect pilots. The pressure-suit “Atlant” is adapted to rehabilitation purposes of neurological patients, it impacts the postural musculation, red muscle fiber, provides postural stability, as well as the proper work of antagonistic muscles to complete a deliberate movement.

With the help of straining devices, installed in the RPS “Atlant” along the antagonistic muscles of the body and limbs, the myotonic stretching reflex is triggered in each segment, which activates the motor centres functions in all CNS levels.

The kinesio-therapeutic method in RPS “Atlant” creates the conditions for the patient's active participation in mobility rehabilitation process. The patients gain walking skills and other daily important moving skills, which become possible only with the adequate position of the body and limbs.

Through the available objective training with the usage of RPS "Atlant", the patients establish social activity and communication, normal for various functional systems in the motor-cognitive interaction.

For the study of kinesio-therapeutic rehabilitation in RPS "Atlant", 67 patients were selected. Out of those, 47 patients, aged 4 to 12, had infantile cerebral palsy. 20 patients, aged 56 to 67, had an ischemic type of ACVE—acute cerebrovascular event - in the early residual stage.
The Bartel scale was applied to assess the general motor and cognitive skills (Functional Independence Measurement (FIM), the Global Motor Function Measure, Mini-Mental State Examination (MMSE)).

The functional activity and participation were assessed based on the International classification of functions, physical dysfunctions and health.17-20 The functional activity of the studied patients, based on this assessment was the following:

- The mobility of the patients with the cerebral palsy, their independent walking and walking with the technical assistance was restored among 30 % of the non-walking patients taken for rehabilitation.
- Self-care and daily routine skills were restored among 30 % of the patients.

For the patients with ACVE (hemodynamic version, TOAST classification), who had memory impairments for current events, as well as a light stage of speech apraxia, and limb hemiparesis, the following results we achieved:

- Mobility: all the patients taken for rehabilitation started walking independently for long distances;
- Self-care (washing, dressing, having food) was achieved by all the patients of this group;
- 30% of the patients gained working skills, 20 % of whom got work at home.

For the patients with ACVE (lacunar version, with brain impairment in the medial cerebral artery system), the following results were gained:

- Mobility: 40% of the patients started to walk independently, 20% of the patients could walk with a cane;
- Self-care - independent washing and having food—became possible for 67% of the patients;
- Working skills were gained by 30% of the patients, with 20% of them getting a work at home.

Conclusions
1. To increase the efficiency of neurorehabilitation, the pathogenetically valid methods should be used for restoration of motor and cognitive functions providing reintegration of motor-cognitive interaction.
2. The developed Russian integrated technology of rehabilitation based on kinesi-therapy with RPS “Atlant” allows for restoration of patients’ motor and cognitive functions to the level of independent performance of various daily activities. It shows an efficient cooperation of vestibular and visual sensory systems, provides the response to the internal and the external environmental infrastructure.

References