

Psychological Peculiarities of the Introductory Period of Physical Rehabilitation of Patients with Ischemic Stroke

Психологічні особливості початкового періоду фізичної реабілітації хворих на ішемічний інсульт

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ABSTRACT

The purpose of our article is to study psychological peculiarities of the introductory period of physical rehabilitation of patients with ischemic stroke.

Research methods. There were used psychological and pedagogical research methods: the analysis of literature sources, the method of psychological and pedagogical observation, psychological and pedagogical experiment.

The results of the research. We proved that psychological objectives of the introductory period of physical rehabilitation of patients with ischemic stroke were: 1) restoration of proper breathing; 2) the formation of the psychological basis for the implementation of motor actions; 3) learning the elements of basic motor actions: the accuracy of motor tasks, maintaining a certain posture (starting position) in the process of doing exercises; 4) learning the basics of ideomotor exercises; 5) learning methods of self-control.

Conclusions. It was shown, when performing new exercises, patients had experienced psycho-emotional stress, which had led to signs of fatigue (even when performing only a few physical exercises). It was manifested in the form of inadequate response of the cardiovascular system to the proposed load, and changes into the psycho-emotional state of the patient (increased anxiety, loss of interest, decreased concentration, etc.). In the presence of only subjective sensations of the emotional nature, when there was no inadequate response of the cardiovascular system to the proposed load, we used the method of "switching". In a case of "switching" we asked the patient a general question in order to listen to his/her answer. This technique significantly accelerated the recovery of the person's activity. When we observed fatigue associated with reduced levels of functionality, the patient was offered rest until complete recovery of a cardiovascular system.

Key words: *ischemic stroke, the introductory period of physical rehabilitation, psycho-emotional stress, anxiety, loss of interest, concentration of attention.*

Introduction

Cerebral stroke, or cerebrovascular accident, is one of the most common diseases today, and, unfortunately, this disease leads to significant qualitative changes in the lives of a large number of patients each year (Kharchenko & Vashchenko, 2021).

According to the WHO, the incidence of stroke varies from 1.5 to 7.4 per 1.000 population each year, and in Europe stroke affects more than 1 million people each year (these data were obtained through clinical trials during 2007-2018). It has been established that 1/3 of patients who have suffered because of a stroke are of working age, but only 20% of them return to work (Villar, Blanco & del Campo, 2015). Mortality due to this disease, according to various authors, is from 17 to 34% in the first 30 days and 25-40% during the first year of the disease. Currently, there is a remarkable trend towards some reduction in mortality from ischemic stroke due to early and accurate diagnosis, due to the development of a system of intensive care for stroke (Onufrieva, Chaikovska, Kobets, Pavelkiv & Melnychuk, 2020).

The most frequent and severe consequence of cerebral ischemic stroke is the disorder of the motor functions of the person. Characteristic feature is the polymorphism of motor disorders of patients with cerebral ischemic stroke. In this case, general for patients is only the loss or violation of arbitrary actions (in the cases of hemiparesis or hemiplegia). Other clinical symptoms are largely variable and depend on a certain extent of the size of affected area, also its localization. According to various authors, persistent disturbances of motor function are also observed in the first days after the disease (in 70-80% of cases of patients who had the ischemic stroke) (Kharchenko & Kurytsia, 2021; Hayden, Farrar & Peiris, 2014; Khwaja, 2012).

So, the purpose of our article is to study psychological peculiarities of the introductory period of physical rehabilitation of patients with ischemic stroke.

Methods of the research

There were used psychological and pedagogical research methods: the analysis of literature sources, the method of psychological and pedagogical observation, psychological and pedagogical experiment.

Results and their discussion

Disorders of voluntary movements in ischemic stroke can be considered as a result of inconsistency of complex motor programs which provide arbitrary motility of the individual. The implementation of such programs is associated primarily with the functioning of complex multifunctional systems, in which the leading role belongs to the central motor neuron, which has numerous connections in subcortical formations, for example – with the reticular formation of the brain stem (Ivashkevych & Onufrieva, 2021; Hardeman, Medina & Kozhimannil, 2016).

It was proved that in the studied groups of patients with hemiparesis there is a decrease in the volume of active movements of the affected side (in the experimental group there were more such movements, which are less pronounced, than in other subgroups). The amount of passive movements in the experimental group as a whole is slightly lower than in the control group (Kharchenko & Komarnitska, 2021).

Muscle strength is greatly reduced in a case of all respondents compared to the average situation. The weakest muscles are those ones which are responsible for extending the arm, such as copying, providing supinator movements, flexors of the arm under conditions of pronounced tone, flexors of the thighs and extensors of the ankle joint (Mykhalchuk, Pelekh, Kharchenko, Ivashkevych, Ivashkevych, Prymachok, Hupavtseva & Zukow, 2020).

The average muscle tone of the affected side is slightly higher than in the previous subgroup “plesia + paresis”. Increased

tone is observed in the flexor muscles of the shoulder, elbow, supinators of the hand, in the flexors of the ankle joint and extensors of the hip and knee joints.

In a case of the research of the muscles of the unaffected side in this group of patients (Роговик, 2013; Харченко & Михальчук, 2022а), the volume of active movements was lower than the appropriate volume of movements and amounted ones to $73.44\% \pm 5.3$ – these values are statistically significant at a confidence level of $\rho < 0.01$ according to Student's t-test. The index of the volume of passive movements of the unaffected party was higher (at the level of reliability $\rho < 0.01$ according to the Student's t-test) than the index of the affected party and amounted to $77.83\% \pm 2.1$ compared with normal data. The mean muscle strength of the unaffected side was $70.65\% \pm 4.2$ (at a confidence level of $\rho < 0.01$ according to Student's t-test). The mean muscle tone of the unaffected side was also higher than normal and it was 2.4 ± 0.4 points (41% of maximum) (at a confidence level of $\rho < 0.01$ according to Student's t-test).

Thus, the research of the initial state of voluntary motility of patients with ischemic stroke at the beginning of the course of physical rehabilitation showed the presence of disorders of static and dynamic motor function of arms, legs, were coordinated action of arms and legs, head, torso, but they were quite different in different groups of patients.

The state of motor function of patients with ischemic stroke is characterized in such a way: on the affected side, the maximum values of active, passive movements of muscle strength and the tone are diagnosed in the subgroup "hemiparesis", the lowest – in the subgroup "hemiplegia". On the lacuna side of the lesion, the most pronounced muscle strength and tone are diagnosed in the subgroup "hemiparesis", the largest volume of active and passive movements, in turn – in the subgroup "plesia + paresis", "hemiparesis".

The greatest asymmetry in the state of muscle tone of the affected side is observed in the subgroup "hemiplegia". In the

most amount of patients, goniometry was difficult due to difficulties in understanding the content of the commands given to them. As a result of the research of the volume of active movements, we can say that its reduction depends on the duration of the disease preceding the psychomotor experience. The change in the volume of active movements affects both the affected and unaffected side, but also to varying degrees.

The results of the research of the amount of passive movements suggest that the restriction of passive movements of patients with this disease may be caused by age-related changes in the musculoskeletal system. So, high muscle tone was associated with the underlying disease, sprains, and consequence – acute pain. Thus, the largest amount of passive movements is observed in the subgroup “plesion + paresis” and “hemiparesis”. Some decrease in passive movements of the unaffected side is diagnosed in the subgroup “hemiparesis”, and this is probably due to higher muscle tone.

Analyzing the data on muscle strength, we can say that with increasing duration of the disease the rate of strength increases. The smallest asymmetry of the affected and unaffected parties is observed in the subgroup of patients with hemiparesis, the largest one – in the subgroup of hemiplegia.

The data of the conducted researches show that the patients had pronounced disturbances of both postural and corrective function of the muscles, which were manifested by disturbances in the tone, muscle strength, volume of movements in the joints. This combination of pathological processes led to a violation of the patient’s social adaptation and significantly reduced the level of his/her daily activity.

We will describe the data obtained by us from the study of the state of motor activity of patients with cerebral ischemic stroke by the Bobabl Scale. Thus, assessing the quality of life of patients by the Bobabl Scale, the following results were obtained, given in Table. 1.

Table 1

Active movements demonstrated by the patients with ischemic stroke at the beginning of our research (by the Bobabl Scale)
(M ± T)

| Indicator | The number of patients in the group of "hemiplegia", who have this skill (%) | The number of patients in the group of "hemiplegia + paresis", who have this skill (%) | The number of patients in the group of "hemiparesis", who have this skill (%) |
|--|--|--|---|
| Lifting the head in a stomach position (the main group) | 23.3±6.2 | 34.6±5.0 | 62.5±4.1 |
| Lifting the head in the abdominal position (the control group) | 28.9±1.2 | 30.6±5.7 | 64.8±4.0 |
| Lifting the head in a supine position (the main group) | 35.9±7.1 | 56.1±8.2 | 62.1±5.9 |
| Lifting the head in a position on a back (the control group) | 32.4±4.7 | 55.2±5.0 | 69.7±5.2 |
| Turn from the back to the side through the affected side (the main group) | 19.4±3.7 | 52.4±6.0 | 71.3±5.1 |
| Turn from the back to the side through the affected side (the control group) | 23.8±9.0 | 56.1±2.5 | 77.6±3.0 |
| Turn from the back to the side through the unaffected side (the main group) | 3.2±5.1 | 22.6±2.7 | 50.2±7.3 |
| Turn from the back to the side through the unaffected side (the control group) | 2.7±4.9 | 23.9±4.0 | 54.6±1.1 |
| Turn from the stomach to the back (the main group) | 21.6±3.4 | 32.8±0.9 | 67.8±3.5 |

| | | | |
|--|----------|----------|----------|
| Turn from the stomach to the back (the control group) | 22.1±1.0 | 37.5±2.6 | 62.5±1.0 |
| Crawling on the stomach (the main group) | 0 | 14.3±1.5 | 37.2±0.6 |
| Crawling on the stomach (the control group) | 0 | 17.1±0.3 | 33.1±2.7 |
| Maintaining the position of the crayfish (the main group) | 0 | 9.1±0.5 | 10.7±5.3 |
| Maintaining the position of the crayfish (the control group) | 0 | 11.9±2.7 | 11.7±5.8 |
| Moving crayfish (the main group) | 0 | 6.5±0.7 | 11.2±2.5 |
| Moving crayfish (the control group) | 0 | 7.5±2.3 | 12.4±3.1 |
| Sitting on a chair (the main group) | 0 | 10.2±1.4 | 12.9±0.7 |
| Sitting on a chair (the control group) | 0 | 11.5±2.2 | 11.4±7.5 |
| Sitting from a supine position through the support of the elbows (the main group) | 0 | 7.3±0.3 | 7.8±1.9 |
| Sitting from a supine position through the support of the elbows (the control group) | 0 | 7.4±7.6 | 9.5±0.4 |
| Getting up from your knees (the main group) | 0 | 1.4±5.8 | 0 |
| Getting up from your knees (the control group) | 0 | 1.8±9.2 | 0 |
| The ability to stand up (the main group) | 0 | 0 | 0 |
| The ability to stand up (the control group) | 0 | 0 | 0 |
| Independent walking (the main group) | 0 | 0 | 0 |
| Independent walking (the control group) | 0 | 0 | 0 |

The differences between the obtained results of the respondents of the experimental and control groups are statistically significant (at the level of reliability $p < 0.05$ according to the Student's t-criterion).

As we can see from Table 1, the patients of the hemiplegia subgroup were quite active, mostly only in a horizontal position, with the least effective use of the affected side. In the groups "plegia + paresis" the activity of patients was greater, but the use of preserved movements of the affected side was very ineffective. The absence of patients who independently maintain a vertical position, especially in the subgroup "hemiparesis", in the most cases was determined not by the disease, but by delayed position of no verticalization of patients, which was not carried out.

Also we will describe our research data of the psycho-emotional state of patients with ischemic stroke. As a result of the initial study of the psycho-emotional state of patients with ischemic stroke we used M. Luscher test (Цветовой тест М. Люшера, 2012) revealed the presence of a psychological source of stress (in the form of fear, anxiety, fatigue, dissatisfaction, etc.) of 40 respondents.

The analysis of the colors by group 3, 4 and 1, 7, as well as by the "working group" 2, 3, 4, that characterizes the presence of disorders of self-regulation and the ability to perform effective test activities (under a certain location in one line), respectively, 43 patients with ischemic stroke violation of autonomic regulation of personality and reduced ability to perform effective actions (low motivation to do the exercises).

For example, let us look at the test protocol №23 (the patient is 56 years old). The diagnosis of this patient is ischemic stroke, cerebral infarction in the middle cerebral artery; left-side hemiparesis. Occasionally complains of dizziness, general weakness, poor tolerance from the point of view of exercises and lack of interest in life. The patient did not complain before the test. The ranking of the cards was given by preference: 5, 2, 1, 7, 4, 0, 6, 3 – the first option and 2, 5, 1, 7, 4, 0, 6, 3 – the second one.

The last option was chosen for decryption. In the test report groups 3, 4 (the main, light colors) are located in the second half of the row, and 1, 7 (dark colors) there are in the first half of the row. The "working group" of colors – 2, 3, 4 – is not together, but scattered throughout the series. In the last position it is the main red color (3), so, there is a rejection, the color is rejected. In the first position it is the main color – green (2) – it is a compensation for anxiety. In this case it is seen as a need for self-affirmation.

The following interpretation of the test results was the most possible: "A disorder of autonomic regulation has been diagnosed, there are signs of fatigue and a very serious source of stress with normal compensation. The source of stress is related to the inhibition of physical and sexual needs, with insecurity. Also we diagnosed decreased vital energy, helplessness, inability to influence events that cause irritation, discomfort. The patient is sensitive to criticism, vulnerable.

Cards were ranked in order of preference: 2, 4, 7, 3, 5, 1, 6, 0 and 5, 4, 3, 6, 0, 1, 2, 7. Colors 3, 4 and 1, 7 were located in different ends of the color range. The main colors (blue, green) are placed at 6 and 7 positions, respectively (there is a rejection of these colors). In position 1, as the compensation for the rejection of colors is purple (5) – as a rule, it should be located in the indifferent zone or deviate. The main colors are: blue (1) and green (2) are in the indifferent zone and the zone of rejection. Analyzing the test results, we can assume the presence of disorders of autonomic regulation and sources of stress of this person. Deciphering / - - / functions were indicated: the source of stress is frustration caused by limited freedom of actions, the desire for independence. Interpretation of / + - / functions emphasizes the patient's desire to avoid criticism, any restrictions of personal freedom.

The actualization of stable static and dynamic stereotypes of the patient in all initial positions – from horizontal to vertical ones, using the influence of simple, eye-motor, tonic (labyrin-

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thine tonic reflexes, symmetrical cervical tonic reflex, cervical asymmetric tonic reflex, etc.). Restoration and maintenance of stress resistance of patients is provided by symmetrical maintenance of a projection of the general center of gravity on a basic surface in such initial positions in which normal proper afferentation of joints and muscles will be stimulated. These are the positions that the human body consistently takes in the process of verticalization: a supine position on the back; a lying position on the side (right and left); a supine position; a standing position on the knees; a standing position on the knees (with additional vertical support and without such a support); a standing position (with additional vertical support and without such a support).

It was proved that the starting position became a directly activated position with a torso extension, which had the aim to support all muscle groups of the patient, provided by the stimulation of a successive chain of muscle contractions directed from the center to the periphery of the body. The symmetry of maintaining the initial position of the patient during the lesson is constantly adjusted (passively or actively) in order to stimulate proper afferentation.

One of the directions of postural correction is the so-called "spatial treatment" – laying paretic limbs, which actively used by scientists (Kharchenko & Komarnitska, 2021). This direction of postural correction is performed outside of active correction classes and solves the problem of prevention of disorders of tone and strength orientations of people.

Restoration of the dynamic stereotype: according to that, the distal direction of muscle actions is a prerequisite for translational movement in the space of motor ontogenesis. So, the sequence of exercises should meet the following principles:

- physical exercises should be directed from large muscle groups to small ones; from large joints to small ones; from isometric type of load to a dynamic type;

– physical activity should be taken into account according to biomechanical features of the vertical posture (small area of resistance, high position of the center of gravity, the growth of static moments in the joints of the legs in the distal direction). Ensuring the stability of the limbs it is possible by stabilizing the angles in the joints of the limbs depending on the posture. The key joints of anti-gravity activity are the shoulder and hip joints.

The purpose of movements' correction is to achieve proper physical functions of the extremities. The use of incorrect or pathological movement patterns to facilitate the patient's self-care and increase his/her activity should be excluded.

Physical rehabilitation should be carried out in order to ensure the safety of rehabilitation measures, to avoid fatigue or overexertion of the patient's cardiovascular system and exceed the allowable level of load for the patient. Therefore, each exercise should be implemented under the control of heart rate and blood pressure (before and after exercises), respiratory rate and subjective signs of load transfer (taking into account whether there was lethargy during training or, conversely – psychomotor agitation, sharp skin discoloration, especially on the face in the nasolabial triangle and forehead, increased coordination of movements, weakening of speech function, etc.). Under conditions of exceeding the individual capabilities of the patient and at the time of pathological types of reactions, the intensity of classes decreases significantly due to: reducing their multiplicity, the inclusion of elements of gravitational relief (transition from active movements to active-passive ones, from active-passive movements to passive ones). In the worst case, the coach must stop the implementation of rehabilitation measures until the normalization of the physiological response of a human body.

Breathing exercises are used simultaneously and sequentially with physical exercises in order to stabilize the state of the cardiovascular system and rest of the patient. Performing the

above tasks allows us to create positive conditions for successful recovery of motor functions having been lost as a result of the disease (prevention of muscle tone, elimination of pathological synkinesis, restoration of proper actions, coordinated muscle activity), the development of compensatory skills and creating a ground for self-care skills, providing of education of basic physical skills of the person.

The main directions of *psychotherapy and psycho-correction* of patients who suffered from ischemic stroke are:

- the assistance in the process of understanding the patients, his/her basic needs, motives, instructions, relationships; his/her internal conflicts and mechanisms of psychological protection; features of his/her behavior and emotional response, their adequacy and realism;
- the correction of patients' instructions;
- the assistance in formulating and securing adequate forms of patients' behavior based on personal achievements in the cognitive, motivational, and emotional spheres;
- the promotion of positive motivation for recovery and increased activity in treatment at the behavioral level.

During the classes according to the proposed methodology, we have the aim to achieve the stabilization of a psycho-emotional state of the patient through the correction of his/her cognitive processes that motivate the patient to actions which generally affect the effectiveness of all rehabilitation measures. Proposed by us "Functional Methodology of Physical Rehabilitation of patients with ischemic stroke" (Харченко & Михальчук, 2022b), based on the above principles, is differentiated, ontogenetically determined, which solves the problem of modeling psycho-physiological hierarchical control of motor functions by the nervous system, taking into account the psycho-emotional state and other diseases of the patient.

The "Functional Methodology of Physical Rehabilitation of patients with ischemic stroke", developed by us, was implicated only in the main groups. In the control groups the research was

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organized according to the traditional rehabilitation program. The *main purpose* of the introductory period of physical rehabilitation of patients with ischemic stroke was to identify features of disorders of motor functions, psycho-emotional states of the patients, testing their cardiovascular system, to determine the features of physical rehabilitation in three research subgroups: "hemiplegia", "plegia + paresis", "hemiparesis".

Psychological objectives of the introductory period of physical rehabilitation of patients with ischemic stroke were:

1. Restoration of proper breathing.
2. The formation of the psychological basis for the implementation of motor actions.
3. Learning the elements of basic motor actions: the accuracy of motor tasks, maintaining a certain posture (starting position) in the process of doing exercises.
4. Learning the basics of ideomotor exercises.
5. Learning methods of self-control.

Having done each exercise the main attention was paid to the acquaintance of motor actions (according to the proposed complexes) in order to determine both more accessible movements and such actions that cause the greatest complications from the side of patients. Facilitating patients to master and study physical exercises, we evaluated the technique, amplitude, accuracy of motor actions, compliance with the rhythm of breathing.

Conclusions

When performing new exercises, patients experienced psycho-emotional stress, which led to signs of fatigue (even when performing only a few physical exercises). This manifested itself in the form of inadequate response of the cardiovascular system to the proposed load, and changes into the psycho-emotional state of the patient (increased anxiety, loss of interest, decreased concentration, etc.). In the presence of only subjective sensations that take by the emotional nature, when there was no inadequate response of the cardiovascular system to the proposed load, we

used the method of "switching". In a case of "switching" we asked the patient a general question in order to listen to his/her answer. This technique significantly accelerated the recovery of the person's activity. When we observed fatigue associated with reduced levels of functionality, the patient was offered rest until complete recovery of a cardiovascular system.

The advantages of the "Functional Methodology of Physical Rehabilitation of patients with ischemic stroke", in our opinion, it is the ability to "bring" the patient to a state of not only muscular, but also psychological satisfaction. The second aspect of this approach was a wide range of proposed exercises performed in facilitated conditions of physical rehabilitation. This allowed the patient to get "information" about their state of motor function, to get participation in the movements of different muscle groups, creating the idea of different possibilities of their recovery.

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Харченко Євген, Завадська Ірина. Психологічні особливості початкового періоду фізичної реабілітації хворих на ішемічний інсульт.

Метою статті є вивчення психологічних особливостей початкового періоду фізичної реабілітації хворих на ішемічний інсульт.

Методи дослідження. Використано такі психолого-педагогічні методи дослідження: аналіз літературних джерел, психолого-педагогічне спостереження, психолого-педагогічний експеримент.

Результати дослідження. Доведено, що психологічними завданнями початкового періоду фізичної реабілітації хворих на ішемічний інсульт були: 1) відновлення правильного дихання; 2) формування основи здійснення рухових дій; 3) навчання елементам основних рухових дій: точність виконання рухових завдань, утримання певної пози (вихідного положення) в процесі заняття фізичними вправами; 4) навчання основам ідеомоторних вправ; 5) навчання методам самоконтролю.

Висновки. Показано, що при виконанні нових вправ у хворих спостерігалася психоемоційна напруга, що призводила до появи ознак втоми (навіть під час виконання лише декількох фізичних вправ). Доведено, що останнє виявлялося у формі як неадекватної реакції серцево-судинної системи на пропоноване навантаження, так і зміною психоемоційного стану хворого (підвищення тривожності, втрата зацікавленості, зниження концентрації уваги та ін.). Визначено, що за

умов наявності тільки суб'єктивних відчуттів, що приймають емоційний характер, коли не спостерігалася неадекватна реакція серцево-судинної системи на пропоноване навантаження, ми використовували метод «перемикання». У випадку «перемикання» ми ставили хворому запитання загального характеру з метою вислухати його відповідь. Доведено, що такий прийом помітно прискорював відновлення робочої активності. Актуалізовано, що коли ми спостерігали втому, пов'язану зі зниженням рівня функціональних можливостей, хворому пропонувався відпочинок до моменту повного відновлення показників серцево-судинної системи.

Ключові слова: ішемічний інсульт, початковий період фізичної реабілітації, психоемоційне напруження, тривога, втрата інтересу, концентрація уваги.

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