

EFFECTIVENESS OF PHYSIOTHERAPY METHODS IN THE RESTORATION OF
POSTSURGE MOTOR DISORDERS

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Abstract: This article analyzes the scientifically based effectiveness of physiotherapy methods in the restoration of post-stroke movement disorders. Based on medical literature, systematic reviews, and meta-analyses, the role of physiotherapy procedures in restoring motor activity, accelerating the return to independent life, and improving the quality of life of patients is highlighted. Scientific sources confirm that such approaches as Constraint-Induced Movement Therapy (CIMT), Mirror Therapy (MT), virtual reality (VR), and robotic therapy have shown effective results in post-stroke rehabilitation. The article also assesses the importance of starting early rehabilitation, an individual approach, and the role of a multidisciplinary rehabilitation team as important factors. The research results serve as a theoretical and practical basis for improving post-stroke physiotherapeutic approaches.

Keywords: stroke, rehabilitation, physiotherapy, movement disorders, Mirror Therapy, CIMT, virtual reality, neuroplasticity, rehabilitation effectiveness, multidisciplinary approach

INTRODUCTION

In recent years, cardiovascular diseases, in particular, acute cerebrovascular accident - stroke, have become one of the pressing problems facing the entire world healthcare system. According to the World Health Organization, stroke is one of the leading causes of death and disability in the world. According to statistics, millions of people suffer strokes every year, and most of them are deprived of the opportunity to continue their life independently. The most serious and common types of stroke complications are impaired motor functions, paresis, changes in muscle tone, and balance disorders. Such conditions negatively affect not only the patient's physical health, but also their psychological state, social adaptation, and, in general, the quality of life. Therefore, in the post-stroke period, the use of complex rehabilitation measures, in particular, physiotherapy methods, is of particular importance.

Physiotherapy is a set of methods that treat the human body by exposing it to various physical factors, including electric current, magnetic fields, temperature, ultrasound, laser radiation, and other treatments. It is widely used as an effective remedy for restoring motor activity, increasing muscle strength, improving blood circulation, and reducing pain. In particular, physiotherapy plays an important role in post-stroke rehabilitation, playing an invaluable role in restoring the ability of patients to move independently, preventing secondary complications, and accelerating their return to social life. This article analyzes

scientific-theoretical and clinical approaches to the role of physiotherapy methods in eliminating post-stroke movement disorders, the level of their effectiveness, and their practical application. The purpose of the article is to determine the advantages of physiotherapy procedures at the post-stroke rehabilitation stage, to substantiate the criteria for their individual selection in accordance with the patient's condition, and to statistically assess their effectiveness.

LITERATURE ANALYSIS

The role of physiotherapy in post-stroke rehabilitation, especially in the direction of restoring motor disorders, is widely recognized by the scientific community. Studies conducted in recent years have scientifically confirmed the positive influence of physiotherapy methods not only on the restoration of motor activity, but also on improving the psychological state of patients, increasing the level of independence, and improving the quality of life. In a systematic analysis conducted by Pollock et al. (2022), an in-depth analysis of the effectiveness of physiotherapeutic approaches in the restoration of post-stroke lower limb functions was conducted, and it was shown that therapy based on intensive, repeated exercises plays an important role in restoring the motor function of patients. Studies show that early initiation of rehabilitation and an individual approach further improve the results of physiotherapy (Pollock et al., 2022).

Laver et al. (2021) assessed the methods of virtual reality (VR) therapy used after stroke. Their meta-analysis shows that VR training increases the patient's motivation and can be more effective in restoring hand movements compared to traditional therapy. This indicates the promising nature of the technological approach to the rehabilitation process. Cho et al. (2023) analyzed the effectiveness of mirror therapy in restoring the functions of the upper arm after stroke. According to their research results, this method helps restore motor functions by stimulating neuroplasticity in the central nervous system. This approach is especially successful in patients with unilateral paralysis. Langhorne et al. (2022) show the effectiveness of the combination of medical and rehabilitation services, focusing on the advantages of early rehabilitation after stroke. As a result of the developments carried out by the authors based on a multidisciplinary approach of the rehabilitation team, the patient's recovery rate increased significantly. This circumstance proves the need to integrate the process of post-stroke physiotherapy with other areas of therapy (Langhorne et al., 2022).

Also, Dobkin et al. (2023) emphasize that a collective approach to post-stroke rehabilitation - that is, when physiotherapy, speech therapy, and occupational therapy are combined, it is possible to achieve positive dynamics in the restoration of patient independence. Their research shows that with a comprehensive approach, the recovery rate accelerates, patients find the opportunity to return to life faster. Another important theoretical basis is the concept of "learned nonuse," put forward by Taub (2020). According to this theory, post-stroke inactivity is exacerbated not only by neurological trauma but also by psychological factors. Restoration of movements was achieved by stimulating the active use of the hand after stroke through the method of restrictive-induced movement therapy (CIMT), created on the basis of this concept.

METHODOLOGY

In this study, a theoretical and analytical approach was taken as a basis for studying the effectiveness of physiotherapy methods in the restoration of post-stroke movement disorders. Scientific articles, clinical recommendations, systematic reviews, and meta-analyses related to the field were analyzed as the methodological basis of the study. Existing scientific sources on the role of physiotherapy in post-stroke rehabilitation, forms of application, and theoretical foundations were selected, and based on their analysis, the advantages of physiotherapeutic approaches, general trends, and criteria for their application were determined. The chosen methodological approach served to substantiate the relevance of physiotherapy methods for the restoration of motor activity in the post-stroke period.

RESULTS AND DISCUSSION

Based on the analysis of the literature, it was established that physiotherapy methods for the restoration of post-stroke movement disorders are clinically justified, effective, and in many cases recognized as a necessary means of rehabilitation. As can be seen from the analysis of scientific sources, these methods are one of the main components of treatment in the correction of motor disorders arising in the post-stroke period. In particular, physiotherapy procedures play an important role not only in restoring muscle activity, but also in restoring the balance of all motor systems in the patient's body, improving movement coordination, and accelerating the patient's return to independent life. Physiotherapeutic approaches, with their systemic and step-by-step action, activate the processes of functional recovery in the patient's body. In the considered studies, it is emphasized that training programs based on an individual approach to the restoration of motor functions are more effective. In particular, there is convincing evidence that modern methods, such as functionally oriented therapy (for example, Constraint-Induced Movement Therapy or Mirror Therapy), have shown positive results in increasing the motor activity of the upper extremities of patients. With the help of these therapies, the patient gradually achieves the restoration of the functions of the affected limb, muscle tone normalizes, and movement coordination improves. As a result of numerous observations and experimental studies, it has been established that this type of therapy has a specific and persistent positive effect on the elimination of paralysis, muscle weakness, or discoordination caused by stroke. These approaches are especially important in restoring the patient's ability to independently perform self-care, walking, standing, and basic motor actions.

It is also noted in the literature that modern technologies - in particular, virtual reality (VR), robotic therapy, and teleheilitation - have shown effective results as a means of supplementing or strengthening traditional physiotherapeutic procedures. Performing exercises in a virtual environment increases the patient's interest, motivation, and active participation, while robotic-assisted training stimulates the process of neuroplasticity, ensuring the accuracy and reproducibility of movements. Especially in the long-term rehabilitation process, it is emphasized that these technologies are of great importance in ensuring the continuity of rehabilitation, creating the opportunity for patients to exercise independently. In addition, remote rehabilitation (telerehabilitation) tools create practical conveniences for patients living in remote areas, laying the foundation for the effective use of healthcare system resources. The success of rehabilitation results in the post-stroke period is closely related to such factors as early initiation of treatments, their planned implementation and sufficient duration, as well as the patient's general physiological state, mental preparedness, and availability of socio-psychological support. According to many

sources, the start of the rehabilitation process in the first weeks after stroke is an important factor in preventing muscle atrophy, maintaining muscle tone, and restoring neuromuscular connections.

The results of the analysis show that physiotherapy methods serve not only to restore the physical activity of muscles, but also to activate neuroplastic processes at the level of the central nervous system. This makes it possible to partially compensate for the functional role of brain structures damaged by stroke by other brain centers. Thus, new motor pathways are formed, and the patient gradually achieves the restoration of motor activity. Through these neurophysiologically justified processes, new reflex connections are formed in the control and coordination of movement. During the discussion, it should be especially noted that the effectiveness of physiotherapy methods may not be the same. It varies depending on such factors as the patient's age, the type of stroke (ischemic or hemorrhagic stroke), the affected area of the brain, the time elapsed since the stroke, and the patient's physical and mental state. Therefore, rehabilitation should be planned individually, taking into account the condition of each patient. At the same time, conducting medical rehabilitation based on a multidisciplinary approach with the participation of physiotherapists, neurologists, and other specialists plays an important role in increasing effectiveness. The success of the rehabilitation process largely depends on the therapy regimen chosen systematically and appropriately for each patient.

CONCLUSION

Physiotherapy methods in the restoration of post-stroke movement disorders are recognized as an effective, scientifically based, and widely used means of rehabilitation. Analysis of the literature showed the important role of physiotherapy in restoring muscle and motor functions, increasing the level of patient independence, and improving the quality of life. Early initiation of the therapy process, an individual approach, and the use of modern technologies significantly increase the effectiveness of rehabilitation. Also, the patient's psychological state and social support are important factors influencing the results. Therefore, the highest results can be achieved when physiotherapy methods are applied in a comprehensive approach.

THE LIST OF USED LITERATURE:

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