

ТЕРАПІЯ ТА РЕАБІЛІТАЦІЯ

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EFFECTIVENESS OF PHYSICAL THERAPY IN CERVICAL OSTEOCHONDROSIS AT THE STAGE OF REHABILITATION IN A HEALTH RESORT

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The aim of the article is to investigate the effectiveness of applying physical therapy methods and means in patients with cervical spine osteochondrosis at the stage of health resort treatment. Analysis of specialized scientific and methodological literature to study the current state of the problem of physical therapy in degenerative-dystrophic diseases of the spine; work with medical documentation to select a group of patients with osteochondrosis; assessment of pain intensity using the visual analogue scale; manual muscle testing to evaluate the strength of the head and neck muscles; measurement of the range of motion in the cervical spine and shoulder joint using the goniometry method during special motor tests; statistical data processing methods to determine the effectiveness of physical therapy methods and means in cervical spine osteochondrosis at the stage of health resort treatment. At the stage of health resort treatment, physical therapy methods and means are applied comprehensively, specifically, the developed physical therapy programme for cervical spine osteochondrosis with shoulder joint pain syndrome included therapeutic exercises, therapeutic massage, manual therapy, post-isometric relaxation, as well as hardware and natural physiotherapy methods. The comprehensive application of these selected physical therapy methods at the stage of health resort treatment for cervical osteochondrosis allowed for achieving maximum therapeutic effect in all studied patients: this is evidenced by a significant positive dynamic in all studied parameters of the functional state of the cervical spine and shoulder joint. Specifically, by the end of the three-week period of comprehensive physical therapy, the following results were observed: a reduction in pain intensity in the cervical spine, as measured by the visual analogue pain scale, from severe pain to mild pain; an increase in cervical spine mobility in all directions; an increase in the strength of the head, neck, and shoulder muscles; and an increase in the range of motion in the shoulder joint to normal physiological levels. Thus, the applied complex of physical therapy methods for cervical osteochondrosis is effective and can be used at the stage of health resort treatment. The importance of applying comprehensive physical therapy at the stage of health resort treatment for patients with degenerative spinal changes has been demonstrated. The improved physical therapy programme is aimed at restoring the function of muscles, the spine, and the musculoskeletal system as a whole in cases of degenerative spinal changes. The high effectiveness of the applied complex of physical therapy methods for cervical osteochondrosis at the stage of health resort treatment has been proven, as evidenced by qualitative and quantitative improvements in the strength of paravertebral muscles, the range of motion in the cervical spine and shoulder joint, and the reduction of pain syndrome, which in turn enhances the quality of life for the studied patients. The practical significance of the obtained results lies in their potential use for comparing the effectiveness of various comprehensive physical therapy programmes for osteochondrosis, as well as for assessing the rehabilitation potential of patients with degenerative spinal lesions.

Key words: sanatorium-resort treatment, physiotherapy programme, osteochondrosis.

Тетяна Козій, Наталія Васильєва, Оксана Лаврикова. Ефективність фізичної терапії при шийному остеохондрозі на етапі санаторно-курортного лікування

Метою статті є дослідження ефективності застосування методів і засобів фізичної терапії у хворих на остеохондроз шийного відділу хребта на етапі санаторно-курортного лікування; аналіз спеціальної наукової та науково-методичної літератури з метою дослідження сучасного стану проблеми фізичної терапії при дистрофічно-дегенеративних захворюваннях хребта; робота з медичною документацією з метою підбору контингенту хворих на остеохондроз; оцінка інтенсивності больових відчуттів за візуальною аналоговою шкалою; мануальне м'язове тестування з метою оцінки сили м'язів голови і шиї; вимірювання обсягу рухів у шийному відділі хребта та у плечовому суглобі за допомогою методу гоніометрії під час виконання спеціальних рухових тестів; статистичні методи обробки даних із метою визначення ефективності застосування методів і засобів фізичної терапії при остеохондрозі шийного відділу хребта на етапі санаторно-курортного лікування. На етапі санаторно-курортного лікування застосовують методи і засоби фізичної терапії в комплексі, а саме розроблена програма фізичної терапії при остеохондрозі шийного відділу хребта з больовим синдромом у плечовому суглобі включала: терапевтичні вправи, лікувальний масаж, мануальну терапію і постізометричну релаксацію, методи апаратної та природної фізіотерапії. Комплексне застосування підібраних методів і засобів фізичної терапії на етапі санаторно-курортного лікування при шийному остеохондрозі дало змогу досягти максимального лікувального ефекту в усіх досліджених пацієнтів, на що вказує достовірна позитивна динаміка всіх досліджених параметрів функціонального стану шийного відділу хребта і плечового суглоба. А саме, на кінець тритижневого терміну комплексної фізичної терапії можна констатувати такі результати: зменшення больових відчуттів у шийному відділі хребта за візуальною аналоговою шкалою болю від сильного болю до слабого болю; збільшення рухливості шийного відділу хребта в усіх напрямках; збільшення сили м'язів голови, шиї і надпліччя; збільшення амплітуди рухів у плечовому суглобі до нормальних фізіологічних показників. Таким чином, застосований комплекс методів і засобів фізичної терапії при шийному остеохондрозі є ефективним і може використовуватися на етапі санаторно-курортного лікування.

Показано важливість застосування комплексної фізичної терапії на етапі санаторно-курортного лікування пацієнтів із дегенеративними змінами з боку хребта. Удосконалено програму фізичної терапії, яка спрямована на відновлення функцій м'язів, хребта і опорно-рухового апарату в цілому за дегенеративних змін у хребті. Доведено високу ефективність застосованого комплексу методів і засобів фізичної терапії при шийному остеохондрозі на етапі санаторно-курортного лікування, про що свідчать якісні та кількісні зміни у показниках сили паравертебральних м'язів, амплітуди рухливості шийного відділу хребта і плечового суглобу, зменшення больового синдрому, що, своєю чергою, підвищує якість життя досліджених пацієнтів. Практичне значення одержаних результатів полягає у можливості їх використання за порівняння ефективності різних комплексних програм фізичної терапії при остеохондрозах, а також для оцінки реабілітаційного потенціалу хворих із дегенеративними ураженнями хребта.

Ключові слова: санаторно-курортне лікування, програма фізичної терапії, остеохондроз.

Introduction. One of the most important medical, social, and economic issues of modern society is vertebro-neurological diseases, whose prevalence in economically developed countries, according to WHO, is comparable to non-infectious epidemic levels. Among these diseases, cervical osteochondrosis holds a significant place, performing a degenerative-dystrophic function that contributes to the destruction and disruption of intervertebral discs, leading to changes in the entire structure of the spine. At the same time, disorders of the peripheral nervous system caused by spinal osteochondrosis lead to a decrease in work capacity due to increased economic and moral damage. Neurological symptoms associated with cervical osteochondrosis, such as dizziness, periodic headaches, nausea, digestive disorders, and disturbances in respiratory and mental functions, contribute to the development of disability and negatively impact a person's quality of life [2; 12].

The clinical picture of spinal osteochondrosis is determined by the localization of the degenerative process and is characterised by a chronic course of

the disease, with varying durations of exacerbation and remission periods. The main clinical syndromes of cervical osteochondrosis are: pain syndrome (cervicalgia), neurological syndrome (reflex and radicular), vertebrogenic syndrome, and instability syndrome. The development of degenerative changes in the spinal column is divided into three stages. The first stage is characterized by functional muscle changes – compensatory increase in muscle tone. The second stage represents the phase of functional insufficiency. The third stage marks the development of the dystrophic process in the vertebral-motor segments.

According to the literature [10], 80% of young people in modern Ukraine aged 18 to 39 have been diagnosed with osteochondrosis. This pathology is manifested by headaches in the occipital region, dizziness, and ringing in the ears. The symptom complex can worsen with head turns, and a sharp head movement can lead to loss of consciousness. These symptoms are associated with temporomandibular pain-dysfunction syndrome, which is characterized

by the presence of trigger points in the head muscles, headaches of various nature and localization, neck pain, ear pain, joint pain, toothache, and cracking or crunching when opening or closing the mouth. Contributing factors that accelerate the development of the disease include dynamic and static overload, back injuries, and vibration. There is also information suggesting the potential presence of concomitant heart pathology in this category of patients, which requires further study and examination [7].

The authors note that patients with osteochondrosis experience a high level of fatigue. A comprehensive rehabilitation programme should be based on physical, physiotherapeutic, and psychological rehabilitation technologies. This contributes to the optimization of the neurovegetative system and has a direct impact on improving the quality of life of patients [14].

Loboiko, V. V. [9] proposed a therapeutic-rehabilitation complex using impulse magnetic stimulation for the prevention and treatment of complications from destructive-degenerative spinal lesions in patients with lower back pain. Positive dynamics in the functioning of spinal nerve structures under the influence of impulse magnetic stimulation led to improvements in hemodynamic parameters throughout the vascular system of the lower limbs. It has been established that the foundation of the sanogenetic improvement of blood vessel mechanisms lies in processes that determine their tone, elasticity, and proper response to therapeutic and rehabilitative influences. A positive outcome has also been observed in therapy with biopreparations combined with a set of special therapeutic and health-improving gymnastic exercises, which allows for a reduction in the duration of acute clinical manifestations of cervical osteochondrosis, enhances the recovery of sensory, vascular, and muscle tonic disorders, and helps to avoid neurosurgical intervention in patients with intervertebral disc hernias [5].

The study [4] showed that adding aqua therapy to the main rehabilitation programme improves treatment outcomes for patients with neurological manifestations of cervical spine osteochondrosis. Positive dynamics were observed in patients as follows: reduced cardiovascular system tension and increased adaptive reserves of the body. The mobility indicators of the cervical spine improved, muscle spasms were relieved, muscle tone normalized, and pain decreased. Most patients experience non-specific acute back pain, and clinical outcomes often do not improve. The implementation of national and international guidelines is a slow process, but it helps

reduce costs and protect patients from unnecessary exposure to ionizing radiation [8].

Other researchers note [11] that in the therapy of chronic pain, multimodal rehabilitation concepts are well-known and somewhat similar to specific therapies for neck pain. Multimodal therapy for neck pain leads to comparable improvements in both patients who received conservative treatment and those who underwent neck surgery, although specific differences were found between these two groups of patients.

The aim. The aim of this article is to demonstrate the effectiveness of using physical therapy methods in restoring the health of patients during the sanatorium-resort treatment stage. The objectives also included diagnosing the characteristics of osteochondrosis development, developing the structure of a therapeutic rehabilitation complex, implementing the designed physical therapy program, and assessing its effectiveness.

Materials and methods. The study of the effectiveness of comprehensive physical therapy for cervical spine osteochondrosis during the health resort treatment stage was conducted from July to August 2023, i.e., over a one-month period, at a health resort complex located in the center of the «Serhiivka» resort (Bilhorod-Dnistrovskyi district, Odesa region). The wellness and preventive care facility is equipped with the necessary infrastructure for the diagnosis and sanatorium-resort treatment of diseases of the musculoskeletal system, central and peripheral nervous systems, respiratory and circulatory systems, digestive organs, gynecological and certain urological conditions, as well as the consequences of spinal injuries and diseases. One of the therapeutic factors of this climatic resort is the water of the Shabolat Estuary, which is chloride-sodium-magnesium in composition and used for balneotherapy.

The resort has significant reserves of high-quality (impurity-free) therapeutic mud, which is a black, sometimes dark grey substance with the smell of hydrogen sulphide and ammonia. This mud is sticky, plastic, has high heat capacity, and low thermal conductivity. In addition to the organic «skeleton» of the mud, it contains a so-called colloidal complex made up of very fine particles of iron, aluminium, humus, etc. The specific gravity of the Shabolatsky Liman mud ranges from 1,3 to 1,6 g/cm³. The mud is alkaline, with a pH of 8.2.

The study involved patients with a clinical diagnosis of cervical osteochondrosis in the remission stage, accompanied by pain syndrome in the shoulder-scapular joint, in a group of 16 individuals aged 45 to 55 years, who underwent a three-week course of

sanatorium-resort treatment. The criteria for patient selection included: approval from a physician, absence of contraindications to therapeutic exercises, and personal consent.

During the analysis of medical records, we compiled a comprehensive profile of each patient, including age, gender, anthropometric and somatoscopic data, primary diagnosis, comorbidities, laboratory and clinical diagnostic results, and conclusions from radiological examinations, among other information.

The functional state of the patients was diagnosed starting with the assessment of the severity of the vertebrogenic pain syndrome (cervicalgia), as pain in degenerative lesions of the cervical spine is the most significant manifestation of the disease, affecting the quality of life. The intensity of pain sensations in the cervical spine was determined based on the patient's subjective perception of pain at the time of examination while in a state of functional rest. For this purpose, we used a ranking method for assessing pain intensity using the Visual Analog Scale (VAS). The diagnosis of the vertebrogenic syndrome was conducted during the physical examination using manual and movement tests. The assessment of the strength of the head and neck muscles was performed using Manual Muscle Testing (MMT). The measurement of the range of motion in the cervical spine was conducted using the goniometry method during specific movement tests and was recorded in degrees.

After conducting the examination and assessing the functional state of the patient, a comprehensive programme of physiotherapy methods was integrated into the course of sanatorium-resort treatment based on the obtained results. Each patient underwent this programme according to a specific schedule and at designated times, which included:

- Manual therapy;
- Post-isometric relaxation;
- Therapeutic exercises;
- Medical massage;
- Ascending shower;
- Baths (turpentine, coniferous, lavender);
- Speleotherapy;
- Aromatherapy;
- Oxygen cocktail;
- Mud applications to areas such as the cervical-collar zone, shoulder joint area, cervical spine, and collar zone according to Shcherbakov;
- Apparatus physiotherapy: amplipulse therapy, magnetotherapy, Darsonval therapy, and electrophoresis with medicinal substances (bischofite).

After three weeks of sanatorium-resort treatment, a second assessment of the functional state of patients with cervical osteochondrosis was conducted using the same methods and under the same conditions; this was done to determine the effectiveness of the implemented comprehensive physiotherapy programme and to evaluate the dynamics of clinical manifestations and changes in the vital functions of patients with osteochondrosis.

In the third stage, statistical and graphical processing of the obtained data was performed.

The research results were processed using the «BioStat» mathematical statistics software. The mean statistical values (M) of all studied parameters and their deviations ($\pm m$) were calculated. The reliability of differences between the functional state indicators of the examined individuals at the beginning and end of the treatment was calculated using the one-sample Wilcoxon T-test. Changes in the indicators were considered significant at a probability level of $p \leq 0.05$.

The main goal of the physiotherapy programme was to reduce pain syndrome and improve mobility by halting the progression of the osteochondrosis process and its accompanying pathophysiological phenomena, as well as to achieve the maximum possible physical and psychosocial adaptation of the patients.

Results. The results of the assessment of pain syndrome in the studied patients, presented in Table 1 and Figure 1, indicate a decrease in the level of subjective pain perception, evidenced by a statistically significant reduction in pain intensity indicators at rest according to the Visual Analog Scale (VAS).

Thus, the individual indicators of subjective pain perception among patients before the start of sanatorium treatment ranged from 3,5 to 8,5 points, while after a 21-day treatment period, the range was from 0 to 3 points. The average group indicator for the dynamics of pain perception was -5 points, indicating that the intensity of pain sensations in the cervical spine, according to the visual analog scale for pain, decreased from severe pain to mild pain, specifically from $5,8 \pm 0,5$ points to $0,8 \pm 0,2$ points, at a significance level of the differences between the means of $p < 0,05$.

The results of manual muscle testing (MMT), which we used to assess the strength of the head and neck muscles in patients with cervical osteochondrosis, are presented in Figure 2.

Figure 2 shows that the muscles responsible for flexing the head and neck in the frontal plane developed the least strength during isometric contraction in response to external resistance from the researcher when attempting to tilt the head to the

Table 1

The dynamics of subjective perception of pain intensity (in points) in patients with cervical osteochondrosis during the stage of sanatorium-resort treatment

Indicators (n=16)	Initial Indicators (before the start of sanatorium treatment)	Control Indicators (after 21 days of sanatorium treatment)	Dynamic Indicator	T	p
M±m	5,8±0,5	0,8±0,2	-5	6,8	p<0,05

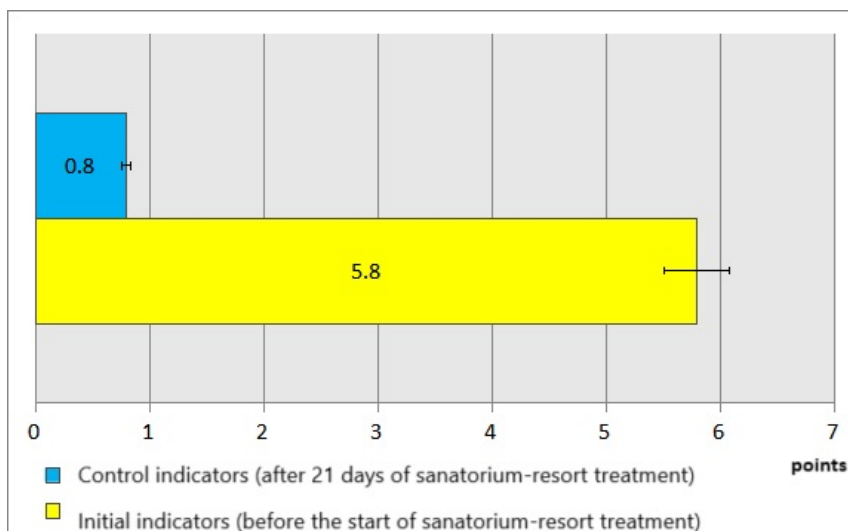


Fig. 1. The dynamics of subjective pain intensity perception in patients with cervical osteochondrosis during the stage of sanatorium-resort treatment

right. For this functional group of muscles, which includes the sternocleidomastoid muscle as well as all flexor and extensor muscles of the head and neck, a significant reduction in strength was observed, with an average MMT score of $2,4 \pm 0,1$ points. This condition of the studied muscles indicated compression of the spinal nerve roots on the right side, from which the nerves that innervate these muscles originate. After three weeks of comprehensive physical therapy, this muscle group in the examined patients with cervical osteochondrosis showed a moderate degree of strength reduction, and their average muscle strength score significantly increased to $3,9 \pm 0,1$ points, with a statistical significance level of $p < 0,05$.

The low initial average strength score of the sternocleidomastoid muscle ($2,6 \pm 0,2$ points) during the test movement of simultaneous head tilt to the right and face rotation to the left also indicated possible right-sided compression of the spinal nerve roots due to cervical osteochondrosis in the examined patients. At the end of the three-month treatment period, this muscle significantly increased its strength in all examined patients to an average score of $3,7 \pm 0,1$ points, corresponding to moderate muscle strength.

The head and neck flexor muscles on the left side in the examined patients were found to be the most

preserved, characterized by slight strength reduction against external resistance from the researcher when tilting the head to the left, and their average strength score at the beginning of the sanatorium treatment was $4,2 \pm 0,1$ points. After three weeks of physical therapy, the strength of the head and neck muscles on the left side increased to $4,9 \pm 0,1$ points, corresponding to full-range active movement against maximum external resistance.

The muscles were somewhat more pliable in response to external resistance during the rotation of the face to the right while simultaneously tilting the head to the left, which was reflected in an average score of $3,6 \pm 0,1$ points at the beginning of treatment. By the end of the three-week physical therapy period, the strength of the flexor and rotator muscles on the left side had significantly increased to $4,3 \pm 0,1$ points, with a $p < 0,05$.

The average strength score of the flexor muscles of the head and neck in patients with cervical osteochondrosis at the beginning of sanatorium treatment was $2,6 \pm 0,2$ points, indicating significant pliability against external resistance from the researcher when attempting to tilt the head forward. By the end of the three-week treatment period, the muscles in this functional group, namely the

anterior and lateral rectus muscles of the head, the long muscle of the head, the deep scalene muscles of the neck, and the anterior group of neck muscles, significantly ($p < 0,05$) increased their strength in all studied patients to an average score of $3,8 \pm 0,2$ points, corresponding to moderate muscle strength.

The extensor muscles of the head and neck, which include the deep large and small posterior rectus muscles of the head, the superior and inferior oblique muscles of the head, the splenius muscles of the head and neck, and the spinal muscle, were somewhat less pliable. For the muscles of this functional group, moderate strength reduction was characteristic, with an average strength score during manual muscle testing (MMT) before the start of sanatorium treatment being $2,9 \pm 0,2$ points. By the end of the 3-week treatment period, the strength of the head and neck extensor muscles significantly increased ($p < 0,05$) to $3,9 \pm 0,2$ points,

corresponding to a mild degree of muscle strength reduction.

The upper trapezius muscle in patients with cervical osteochondrosis showed a significant reduction in strength when elevating the shoulder girdle against the resistance of the examiner before the start of the physical therapy course. Upon repeated manual muscle testing, the result significantly improved from $2,7 \pm 0,2$ points to $3,6 \pm 0,2$ points, with $p < 0,05$.

During the testing of the scapula elevator muscle, a reduction in muscle strength was observed in response to external resistance in the cranio-caudal direction, with a moderate degree in the right m. levator scapulae and a severe degree in the left m. levator scapulae, reflected in the corresponding scores of $3,1 \pm 0,2$ points and $2,7 \pm 0,2$ points at the beginning of the physical therapy course. After three weeks of sanatorium-resort treatment, the strength of the scapula elevator muscle on both the right and left

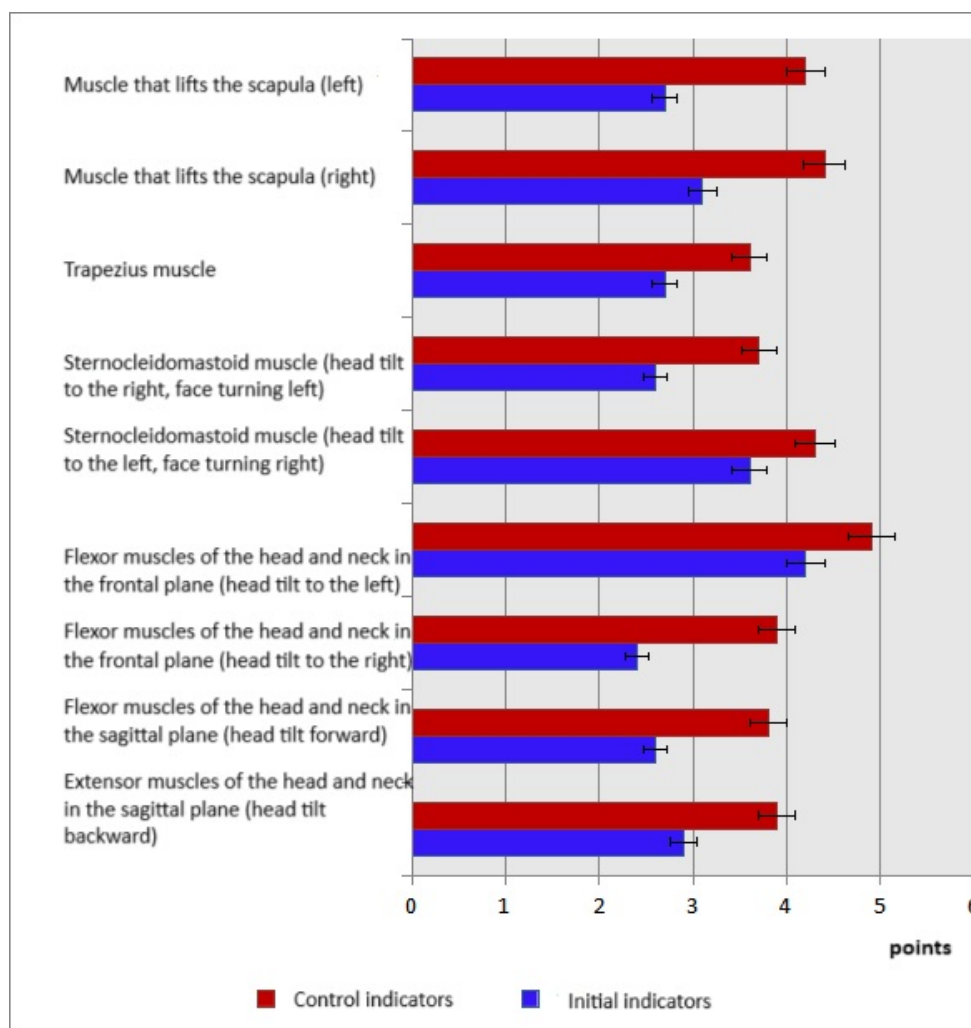


Fig. 2. The dynamics of muscle strength indicators of the head and neck in patients with cervical osteochondrosis during the stage of sanatorium-resort treatment

sides symmetrically increased to $4,4 \pm 0,1$ points and $4,2 \pm 0,1$ points, respectively, with $p < 0,05$.

Indicators of spinal mobility in the cervical region of patients with cervical osteochondrosis, which we assessed by measuring the range of motion using goniometry before and after the application of complex physical therapy for 3 weeks, are presented in Table 2 and Figure 3.

The most pronounced deficiency in the mobility of the cervical spine among the examined patients was observed during extension, specifically, the range of motion when tilting the head backward was limited at the beginning of treatment by 57,1%, averaging $34,3 \pm 1,9^\circ$ from the maximum possible range of $70-80^\circ$. After a three-week course of physical therapy, this indicator improved qualitatively and quantitatively, as evidenced by a statistically significant increase in the average range of cervical extension in the sagittal plane to $40,8 \pm 1,6^\circ$, with $p < 0,05$, indicating a dynamic difference of $6,5^\circ$.

The range of flexion of the cervical spine in the sagittal plane was limited, averaging $37,4 \pm 1,9^\circ$ among the examined patients, which is 37,6% of the maximum possible range of $50-60^\circ$. By the end of the treatment period, the mobility of the cervical spine during maximal forward head flexion significantly increased ($p < 0,05$) by $9,7^\circ$ to $47,1 \pm 1,3^\circ$, approaching the lower limit of the normal range.

The mobility of the cervical spine in the frontal plane was the least restricted, both during right head tilt (by 23,0%) and left head tilt (by 25,4%). The initial values for the range of cervical spine flexion to the right and left were $38,5 \pm 1,4^\circ$ and $37,3 \pm 1,6^\circ$, respectively. However, after 3 weeks of sanatorium-resort treatment, these values significantly increased

($p < 0,05$) in a symmetrical manner by $7,6^\circ$ and $8,7^\circ$, respectively, reaching $46,1 \pm 0,7^\circ$ and $46,0 \pm 1,0^\circ$, and corresponded to the physiological norm ($40-50^\circ$).

The decrease in spinal mobility in patients with cervical osteochondrosis was also indicated by the range of rotational movements, which were more restricted during right head rotation ($53,1 \pm 2,1^\circ$) than left head rotation ($53,8 \pm 2,1^\circ$), with the maximum possible range being $80-90^\circ$. At the end of the comprehensive physical therapy period, there was a positive dynamic in the mobility of the spine around the vertical axis, which was confirmed by a significant and reliable ($p < 0,05$) increase in the range of active rotational movements in the cervical spine by 14° , reaching $67,1 \pm 1,6^\circ$ during right head rotation, and by $11,5^\circ$, reaching $65,3 \pm 1,8^\circ$ during left head rotation.

The functional state of the shoulder joint in patients with cervical spine osteochondrosis was assessed at the beginning and end of sanatorium treatment based on the mobility indicators of the right and left shoulder joints, obtained using goniometry.

The positive dynamics of mobility in both shoulder joints, observed from the goniometry results, are presented in Table 3 and Figure 4.

The study revealed that patients with cervical osteochondrosis had a reduced range of rotational movements in the shoulder joint, primarily due to decreased internal rotation capacity, notably, a more significant limitation in mobility was observed in the right limb ($57,1^\circ \pm 3,1$) compared to the left limb ($68,1^\circ \pm 1,9$). After undergoing a course of comprehensive physical therapy, the range of motion significantly increased in both the right and left shoulder joints, reaching $70,6^\circ \pm 1,5$ and $72,8^\circ \pm 1,6$, respectively.

Table 2

Dynamics of cervical spine mobility indicators in patients with cervical osteochondrosis during sanatorium-resort treatment

Range of motion (in degrees)	Initial indicators (M \pm m)	Control indicators (M \pm m)	T	p	Limitation indicator (y %)
Flexion range of the spine in the sagittal plane (forward head tilt)	$37,4 \pm 1,9$	$47,1 \pm 1,3$	7,2	<0,05	37,6
Extension range of the spine in the sagittal plane (backward head tilt)	$34,3 \pm 1,9$	$40,8 \pm 1,6$	8,6	<0,05	57,1
Flexion range of the spine in the frontal plane (head tilt to the right)	$38,5 \pm 1,4$	$46,1 \pm 0,7$	7,6	<0,05	23,0
Flexion range of the spine in the frontal plane (head tilt to the left)	$37,3 \pm 1,6$	$46,0 \pm 1,0$	6,5	<0,05	25,4
Range of rotational movements of the spine (head turn to the right)	$53,1 \pm 2,1$	$67,1 \pm 1,6$	9,6	<0,05	41,0
Range of rotational movements of the spine (head turn to the left)	$53,8 \pm 2,1$	$65,3 \pm 1,8$	10,4	<0,05	40,2

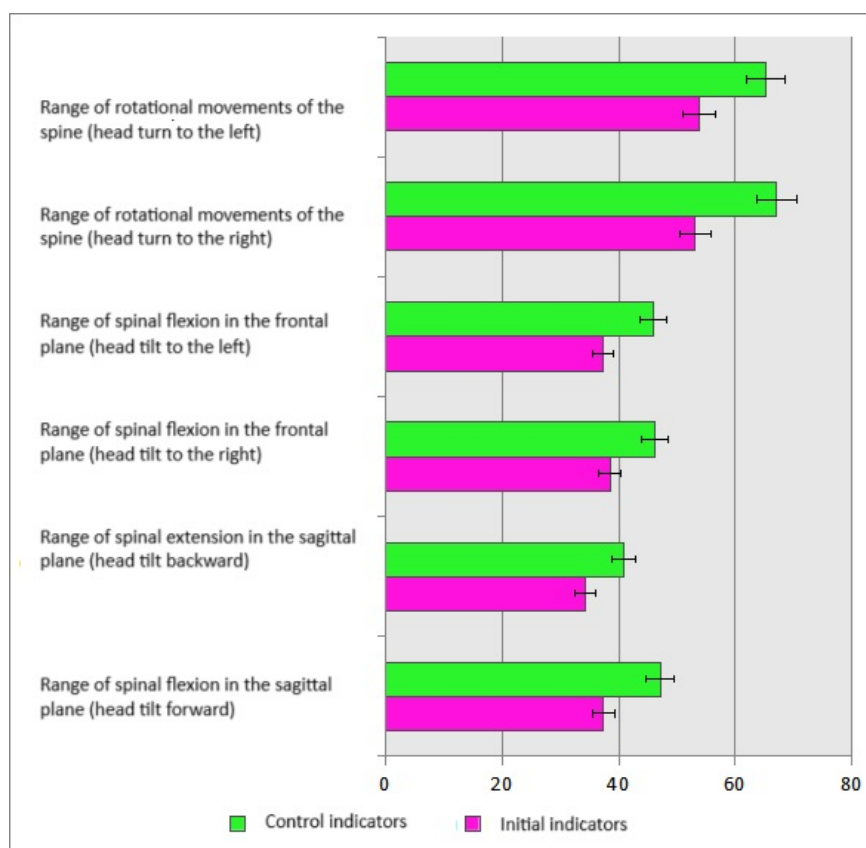


Fig. 3. Dynamics of cervical spine mobility in patients with cervical osteochondrosis during sanatorium-resort treatment

Table 3

Dynamics of shoulder joint mobility in patients with cervical osteochondrosis during sanatorium-resort treatment

Measured movement (N)	Right shoulder joint				Left shoulder joint			
	Initial indicators (M±m)	Control indicators (M±m)	t	p	Initial indicators (M±m)	Control indicators (M±m)	t	p
Flexion (N=180°)	163,0±3,3	169,6±0,7	2,4	<0,05	165,0±2,0	170,1±0,1	2,5	<0,05
Extension (N=60°)	56,9±1,3	59,1±0,5	2,4	<0,05	58,1±1,0	59,8±0,3	1,6	>0,05
Abduction (N=180°)	163,4±2,0	168,8±0,9	3,1	<0,05	163,8±3,1	169,1±0,9	2,0	>0,05
External rotation (N=90°)	67,2±2,1	77,5±0,6	6,2	<0,05	75,3±1,7	80,6±0,7	4,0	<0,05
Internal rotation (N=90°)	57,1±3,1	70,6±1,5	5,0	<0,05	68,1±1,9	72,8±1,6	2,7	<0,05

The external rotation indicators were also more significantly reduced in the right shoulder joint ($67,2^\circ \pm 2,1$) than in the left ($75,3^\circ \pm 1,7$), indicating asymmetric compression of the cervical spinal nerves that give rise to the brachial plexus and peripheral nerves innervating the shoulder joint and upper limb muscles. At the end of the course of sanatorium-resort treatment, the mobility indicators for this type

of movement significantly improved in the right joint, specifically by $10,3^\circ$ (to $77,5^\circ \pm 0,6$), while the improvement in the left joint was less pronounced (to $80,6^\circ \pm 0,7$), with an increase of $5,3^\circ$.

A slight limitation of mobility was observed when performing flexion and abduction movements of the upper limb above the horizontal level, compared to the normal range of 180° , with almost equal effects

on both the right and left limbs. Thus, the amplitude of flexion in the right limb was somewhat reduced to $163.0^\circ \pm 3.3$, and the amplitude of abduction was reduced to $163.4^\circ \pm 2.0$. After completing the course of physical therapy under sanatorium-resort conditions, the amplitude of flexion of the right limb above the horizontal level significantly increased to $169.6^\circ \pm 0.7$. The amplitude of abduction of the right limb above the horizontal level also improved to $168.8^\circ \pm 0.9$. The functions of flexion and abduction in the left upper limb were also slightly reduced, specifically to $165.0^\circ \pm 2.0$ for flexion and to $163.8^\circ \pm 3.1$ for abduction. The control measure for flexion function in the left limb increased to $170.1^\circ \pm 0.1$, and the abduction function increased to $169.1^\circ \pm 0.9$, which is statistically insignificant ($p > 0.05$).

As for the extension function in the shoulder joint of these patients, it remained almost unchanged, as indicated by the initial and control measures of extension amplitude, which corresponded to the physiological norm.

Thus, based on the data presented in the table and diagram, we can confidently state that there is a clear improvement and increase in mobility in the shoulder joint in the directions of flexion, extension, abduction, and rotation, indicating the high effectiveness of the physical therapy conducted during the sanatorium-resort treatment of individuals with cervical osteochondrosis.

Discussion. The assessment of the effectiveness of the physical therapy methods began with

determining the degree of regression of the pain syndrome, as pain in degenerative lesions of the spine is the most significant manifestation of the disease for the patient, influencing their quality of life and functional status. Therefore, we first analysed the dynamics of subjective perception of pain intensity during the state of functional rest in patients with cervical osteochondrosis, which was measured using a visual analogue scale for pain assessment before and after a complete 21-day course of sanatorium-resort treatment. In our previous research, Vasylieva N., et al. (2022) [15], this approach demonstrated positive dynamics for patients with lumbar osteochondrosis.

The elimination of the pain syndrome was achieved through the decompression of the spinal nerve roots using specialized manual therapy techniques, therapeutic massage, post-isometric relaxation, and specific therapeutic exercises that facilitated the return of the vertebrae to the proper position and relieved nerve fibres from compression. The obtained results regarding the positive impact of therapeutic exercises on pain syndrome in degenerative-dystrophic lesions of the vertebral-motor segments are consistent with the findings of Sekendiz B. (2007) [13] and Wells C. (2012) [16], who indicated appropriately selected exercises helped alleviate pain by relaxing spasmed muscles, as muscle imbalances often develop in osteochondrosis: some muscles remain in a state of tonic tension while others become excessively relaxed. If muscle spasms persist for an extended period, local thickening (myo-

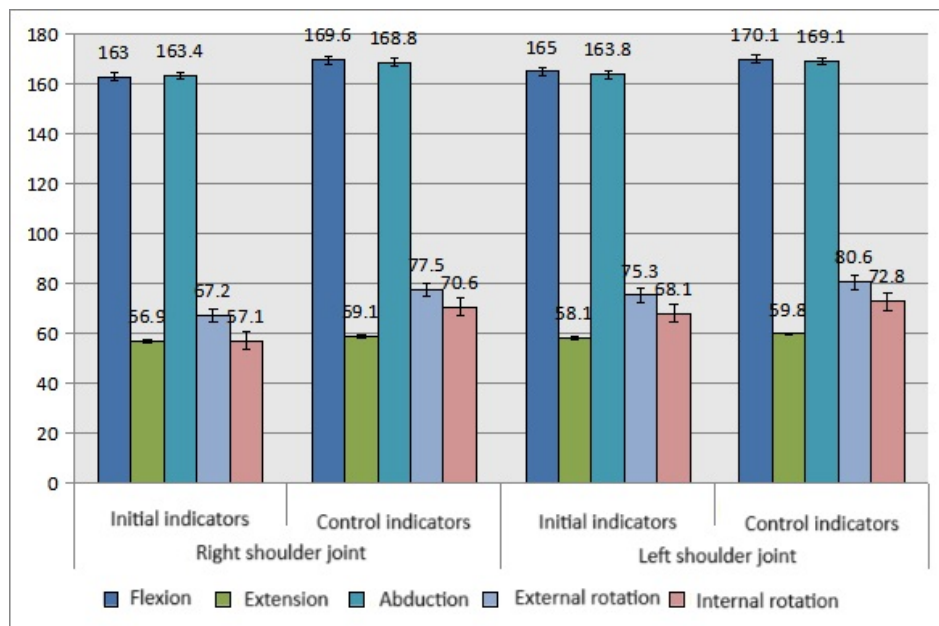


Fig. 4. Dynamics of shoulder joint mobility indicators in patients with cervical osteochondrosis during sanatorium-resort treatment

gelosis) can form within the muscles, which become sources of pain (trigger points).

Reflex muscular hypertonicity (muscle spasm), as a response to chronic neck pain aggravated by static and dynamic loads, may lead to impaired cervical spine mobility. This was observed in our study as a limitation in the range of motion in patients with cervical osteochondrosis at the onset of sanatorium-resort treatment. Restricted cervical spine motion may result from compensatory tension in the paravertebral back muscles due to spinal instability. Analgesic myofixation of the spine arises because any movement within the spinal kinematic chain is transmitted to the affected motion segment, altering intradiscal pressure and irritating the receptors of the sinuvertebral nerve. A widespread form of myofixation is characteristic of reflex tension in both deep and superficial muscles of the spinal segments. This was confirmed by the results of manual muscle testing of head and neck muscles in patients with cervical osteochondrosis in our study and aligns with the findings of Brevik H. (2006) [3], who demonstrated that the local form of myofixation is caused by immobilization of the vertebral motor segment due to reflex- tonic contraction of deep monoarticular muscles. Timely identification of deep cervical muscle tone imbalance in patients with osteochondrosis, along with early intervention using physical therapy methods, can significantly improve treatment efficacy and reduce the duration of treatment and rehabilitation. This is supported by our research findings (Vasylieva N., et al., 2022 [15]) as well as by Horoshko, V. I. (2023) [6], who emphasized that modern diagnostics and a rational treatment approach can lead to earlier rehabilitation and improved functional capacity in patients with cervico-cranial pain associated with cervical osteochondrosis.

Recovery of mobility in the affected cervical spine due to osteochondrosis occurred through stretching and improving the elasticity of the head and neck muscles using special therapeutic exercises, therapeutic massage techniques, manual

therapy, post-isometric relaxation, and other methods included in the course of comprehensive physical therapy during the sanatorium-resort treatment of the examined patients.

Conclusions. The comprehensive application of physical therapy methods and means included in the sanatorium-resort treatment programme for cervical osteochondrosis led to the achievement of maximum therapeutic effect in all examined patients, as evidenced by the reliable positive dynamics of all studied parameters of the functional state of the cervical spine and shoulder joint. Specifically, the effectiveness of the treatment is demonstrated by the significant reduction in pain intensity in the cervical spine, from severe pain to mild pain, according to the visual analogue scale of pain. The results of manual-muscle testing after 21 days of physical therapy showed a significant increase in the strength of the head and neck muscles. The greatest improvement was observed in the flexor and extensor muscles of the head and neck, indicating a reduction in spinal nerve root compression. There was also an increase in the strength of the levator scapulae and trapezius muscles. After treatment, there was a significant improvement in the mobility of the cervical spine in all directions, as confirmed by the results of goniometric measurements. The greatest increase in the range of motion was noted in cervical spine extension and flexion. After the physical therapy course, the functional state of the shoulder joints also improved, specifically, there was an increase in the range of rotational movements, flexion, and abduction of the limbs. The mobility indicators of the shoulder joint approached the physiological norm, indicating the restoration of neuromuscular regulation.

Thus, the developed comprehensive physical therapy programme in the conditions of sanatorium-resort treatment over three weeks is highly effective, significantly improving the functional state and quality of life of patients with cervical osteochondrosis.

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