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THE REHABILITATION INFLUENCES OF THERAPEUTIC EXERCISES ON THE NEUROLOGICAL FOCAL SYMPTOMS IN PATIENTS WITH LUMBOSACRAL SPINE OSTEOCHONDROSIS

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Abstract

Physical therapy of patients with lumbosacral osteochondrosis is the recent problem in clinical neurology, family medicine and kinesiotherapy. Dorsalgia is a prominent symptom of this disease, it has been observed at 40–80 % of population. **Goal of research:** to establish the effectivity of therapeutic exercises which are used for physical therapy of the lumbosacral osteochondrosis. **Methods of research:** analysis and compilation of modern scientific sources of information, clinical tests, statistical techniques. **Research results:** 44 patients, divided into control and experimental groups, participate in the research. Every group consists of 22 patients. All sick persons got pharmaceutical treatment after guideline for the diagnosis and treatment of vertebral osteochondrosis (MOZ Ukraine). Additionally the patients from experimental group had therapeutic exercises. All the patients estimated the pain intensity on the 1st and 10th day of therapy according to the VAS. On the same days the stretch symptoms were observed as the criteria of the state of lumbosacral spine. It was found the VAS score, determined on the 1st day, was statistical different in both group from the VAS score, determined on the 10th research day. During exam of Laseague sing it was established the data received on the 1st day were statistical different from the data received on the 10th day. Besides the Laseague sing indexes obtained in the experimental group on the 10th day were statistic different from the same indexes in the control group. **Summary.** It is proved the combined use of the pharmaceutical treatment and the therapeutic exercises is more effective for pain relief and block of the neurological local signs than single pharmaceutical treatment at the patients with lumbosacral osteochondrosis.

Key words: lumbosacral osteochondrosis, therapeutic exercises, stretch symptoms, visual analogue scale, dorsalgia, rehabilitation

Олена Якобсон, Наталя Грейда, Володимир Лавренюк, Оксана Грицай. Реабілітаційні впливи терапевтичних вправ на локальні неврологічні симптоми при остеохондрозі попереково-крижового відділу хребта. Фізична терапія хворих на остеохондроз попереково-крижового відділу – актуальна проблема в неврології, сімейній медицині та ЛФК. Дорсагія, яка є базовим проявом цієї нозології, трапляється в 40–80 % населення. **Мета дослідження** – оцінити ефективність терапевтичних вправ як складової частини фізичної терапії при остеохондрозі попереково-крижового відділу хребта. **Методи дослідження** – аналіз та узагальнення сучасних наукових інформаційних джерел, клінічні методи, методи математичної статистики. **Результати дослідження.** У дослідженні брали участь 44 пацієнти, яких поділено на контрольну й експериментальну групу. У кожну входило по 22 людини. Усі пацієнти отримували медикаментозне лікування остеохондрозу попереково-крижового відділу хребта згідно з рекомендаціями МОЗ України. Хворі, які входили в експериментальну групу, додатково займалися ЛФК. Усі досліджувані оцінювали інтенсивність болю за візуально-аналоговою шкалою на 1-й і 10-й дні лікування. У ці ж терміни в пацієнтів перевіряли стан попереково-крижового відділу хребта за допомогою симптомів натягу. У процесі аналізу отриманих показників встановлено, що показники за візуально-аналоговою шкалою, які виявлено в 1-й день дослідження, статистично значимо відрізнялися в обох групах від даних за візуально-аналоговою шкалою, отриманих на 10-й день. Аналогічну ситуацію спостерігали щодо результатів, які зафіксовано під час проведення симптому Ласега: дані, отримані в 1-й день, статистично значимо відрізнялися від результатів, встановлених на 10-й день дослідження. Також значення цих показників на 10-й день у хворих експериментальної групи були статистично значимо нижчі від відповідних показників у пацієнтів контрольної групи. **Висновки.** Установлено, що комбіноване застосування медикаментозного лікування та терапевтичних вправ більш ефективно для зменшення інтенсивності болю та проявів патологічної неврологічної симптоматики при остеохондрозі ПКВХ, ніж використання тільки медикаментозної терапії.

Ключові слова: остеохондроз попереково-крижового відділу хребта, терапевтичні вправи, симптоми натягу, візуально-аналогова шкала, дорсалгія, реабілітація.

Елена Якобсон, Наталья Грейда, Владимир Лавренюк, Оксана Грицай. Реабилитационные воздействия терапевтических упражнений на локальные неврологические симптомы при остеохондрозе пояснично-крестцового отдела позвоночника. Физическая терапия больных остеохондрозом пояснично-крестцового отдела является актуальной проблемой в неврологии, семейной медицине и ЛФК. Дорсалгия, которая считается базовым проявлением этой нозологии, встречается у 40–80 % населения. **Цель исследования** – оценить эффективность терапевтических упражнений как составляющей физической терапии при остеохондрозе пояснично-крестцового отдела позвоночника. **Методы исследования** – анализ и обобщение современных научных информационных источников, клинические методы, методы математической статистики. **Результаты исследования.** В исследовании приняло участие 44 пациента, которые были разделены на контрольную и экспериментальную группы. В каждую входило по 22 человека. Все пациенты получали медикаментозное лечение остеохондроза пояснично-крестцового отдела позвоночника в соответствии с рекомендациями Минздрава Украины. Больные, которые входили в экспериментальную группу, дополнительно занимались ЛФК. Все больные оценивали интенсивность боли по визуально-аналоговой шкале на 1-й и 10 дни лечения. В эти же сроки у пациентов проверяли состояние пояснично-крестцового отдела позвоночника с помощью симптомов натяжения. При анализе полученных показателей установлено, что показатели по визуально-аналоговой шкале, которые обнаружены в 1-й день исследования, статистически значимо отличались в обеих группах показателей по визуально-аналоговой шкале, которые получены на 10-й день. Аналогичная ситуация сложилась с результатами, зафиксированными при проведении симптома Ласега: данные, полученные в 1-й день, статистически значимо отличались от результатов, которые установлены на 10-й день исследования. Также значение этих показателей на 10-й день у больных экспериментальной группы было статистически значимо ниже соответствующих показателей у пациентов контрольной группы. **Выводы.** Установлено, что комбинированное применение медикаментозного лечения и терапевтических упражнений более эффективно для уменьшения интенсивности боли и проявлений патологической неврологической симптоматики при остеохондрозе ПКВХ, чем использование только медикаментозной терапии.

Ключевые слова: остеохондроз пояснично-крестцового отдела позвоночника, терапевтические упражнения, симптомы натяжения, визуально-аналоговая шкала, дорсалгия, реабилитация.

Introduction. At the present stage both diseases and lesions of the spine are dominant in the structure of diseases among the population. Dorsalgia, which is the most common manifestation of the various pathological vertebrogenic conditions, is found in 40–80 % of the population. At the age from 20 to 65 years are complaining of back pain 24 % of men and 32 % of women [1; 6].

Osteochondrosis of the spine is the most common cause of spine pathology, which ranks first in the group of diseases of the musculoskeletal system. In this nosology there are degenerative-dystrophic changes in the intervertebral disks, that reduce their elastic qualities and have a negative impact on the functional state of the spine [4]. Clinically, this condition is manifested by a decrease in spine endurance to static loads, caused pain, and decreased range of motion.

There has recently been a trend towards relatively early osteochondrosis debut – it is observed at the ages of 25–50 years, that is, in the working population. In 27 % of cases of spinal osteochondrosis occurs a temporary disability, in 3 % – disability [3]. These figures indicate insufficient use of methods and means of treatment and physical therapy for the patients with the specified pathology. Therefore recovery of locomotor function of the lumbar-coccygeal region of the spine (LCRS) is not only a medical, but also a social problem. It needs a balanced comprehensive approach that includes not only medical treatment, but also physical therapy and social rehabilitation of the patients.

The research was conducted within the scientific department topic: «Quantifying the value of effects of rehabilitation actions» (state registration number 0116U002282) for 2016–2018 years.

Therefore, **the aim of our research** is to evaluate the efficacy of therapeutic exercises as part of physical therapy in osteochondrosis LCRS.

Research methods – analysis and synthesis of modern scientific information sources, clinical methods (content analysis of medical records, determining the intensity of pain on a visual analogue scale (VAS), clinical tests to determine the state of the LCRS), and methods of mathematical statistics.

The research was conducted at the communal establishment «Lutsk center of primary care». It was attended by 44 patients who were divided into a control (CG) and an experimental group (EG). Each group consisted of 22 people. All the patients received pharmacological treatment for osteochondrosis of the LCRS as recommended by the Ministry of Health of Ukraine and clinical protocols of health care for the patients with dorsalgia. The patients who were in the EG additionally did therapeutic exercises with a physical

therapy instructor within the medical establishment and/or self-training at home, the patients with CG did not conduct such exercises.

To determine the efficiency of therapeutic exercises for physical therapy of osteochondrosis of the LCRS, we assessed pain intensity in the patients based on VAS and performed clinical tests to determine the state of the LCRS, that is, tension symptoms (Lasegue, Neri and Dezheryn symptoms) on the first and the tenth day of outpatient treatment.

VAS is based on the interpretation of the feelings of the patients. To assess pain syndrome, a patient was offered a scale with marks from 0 to 10 and he was asked to mark the figure, which according to the patient, corresponds to the intensity of his pain. When assessing painful manifestations is common the following gradation: 1–4 points – weak pain; 5–6 points – moderate pain; 7–10 points – severe pain [2].

Symptoms of tension arise if there is irritation of spinal roots and spinal nerves, what causes pain syndrome and is accompanied by reflex tension of the associated muscles [5]. When conducting the Lasegue symptom, we paid our attention to the angle of ascent of the lower extremity and determined the degree of manifestation of this symptom. There are several levels of Lasegue symptoms: I level – pain appears when the angle of the ascent straight lower limb is 60° or more; II level – pain appears when the angle of the ascent straight lower limb is $45\text{--}60^\circ$, thus there is a contraction of individual muscles; III level - pain appears when the angle of the ascent straight lower limb is $30\text{--}45^\circ$, in addition, there is a protective muscle contraction and possible autonomic manifestations [5; 10].

The Neri and Dezheryn symptoms are rated on a scale «positive/negative» and have no alternative quantitative assessment. The Dezheryn symptom is considered positive in the case of strengthening pain manifestations when coughing, sneezing or when the patient is pushing. In case of the Neri positive symptom, when the patient lies on his back is marked increasing in pain during passive tilt of his head forward, additionally can be recorded flexion of the bad limb in hip and knee joints [5; 10].

Research Results. Through content analysis of outpatient medical records was found that 100 % of our selected patients have a history of risk factors that increased the possibilities for development vertebrogenic pathology that could affect them. These include: «sedentary» lifestyle, injuries and lesions of the spine in the history, hard physical labor/ carrying heavy loads, age and hormonal changes in the human body, hereditary influences, and various pathological conditions (disorders of the circulatory system and nutrition of tissues of the spine of various origins, physical diseases etc.) [5; 6]. The detection rate of these factors in the patients in the control and the experimental groups is presented in figure 1.

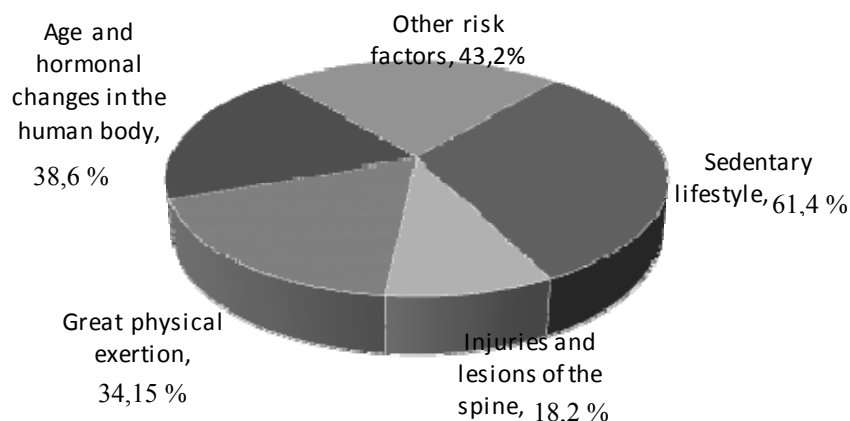


Figure 1. Major Risk Factors that Increase the Possibility of Developing Osteochondrosis of the Spine in the Patients

In addition, it should be noted that in only 40,9 % of the patients had established a risk factor, in 31,8 % of the patients were identified 2 risk factors for osteochondrosis in 27,3 % – 3 and more.

General characteristics of the patients (median age, sex, primary diagnosis) included in the CG and the EG pointed to homogeneity and representativeness of these groups. Therefore, it became possible to compare the results that were obtained after treatment and physical therapy in the CG and the EG, and make conclusions about the effectiveness and usefulness of therapeutic exercises as part of the rehabilitation program in osteochondrosis of the LCRS.

Reference indicators in both groups were the following: in the CG on the first day of treatment the average indicator of VAS was $6,05 \pm 0,373$ ($p \leq 0,05$), during the Lasegue symptom pain arose when lifting limbs on average in $48,55 \pm 2,77^\circ$ ($p \leq 0,05$), the positive Neri symptom was found in 86,3 % of the patients, in 75 % of case the patients had registered the positive Dezheryn symptom. In carrying out the research, in the EG were recorded the following indicators: on the 1 day of treatment VAS was $5,91 \pm 0,384$ ($p \leq 0,05$); when checking the Lasegue symptom pain arose when lifting a limb to $49,14 \pm 3,07^\circ$ ($p \leq 0,05$), 81,8 % of the patients had the positive Neri symptom, the positive Dezheryn syndrome was found in 79,5 % of the patients. When comparing starting indicators in the patients of the CG and the EG were proved that these data are not statistically different ($p \leq 0,05$).

These parameters were re-determined in the patients on the 10 day of observation after treatment and physical therapy (in the EG). The term of 10 days was chosen due to the fact that this is the average duration of outpatient treatment of osteochondrosis of the LCRS. Also, in average on the 8–9 day of treatment begins remission of the disease, so at this time it is possible to evaluate the effectiveness of medication and rehabilitation treatment [6, 7]. When prescribing therapeutic exercises for the patients with osteochondrosis of the LCRS in the EG, we aimed to achieve the following results:

1. Reduction of pain syndrome.
2. Relaxation of postural muscles.
3. Improvement of trophic processes in the spine.

In the case of prescribing therapeutic exercises as part of physical therapy for osteochondrosis of the LCRS, for each patient from the EG was conducted an assessment of his physical condition and state of his cardiovascular system. The complex of therapeutic exercises included passive, ideomotor, breathing, static (isometric) and dynamic (isotonic) exercises [7, 9]. Exercises of each group may varied in the patients from the EG, because they were prescribed individually, depending on the intensity of the pain syndrome, physical condition of the patient, muscle strength and so on. But the general rules of dosing and performing these exercises have been saved.

Passive exercises were conducted in one direction and in the same plane at the same rate. Range of motion in the joint was in the maximum possible extent, which did not lead to the emergence or worsening of pain [6; 8]. In case of strong permanent pain the patient was recommended to conduct ideomotor exercises. Were used two types of breathing exercises – static and dynamic. When conducting dynamic breathing exercises different phases of the respiratory cycle were combined with the movements of the upper limbs and the trunk; when conducting static breathing exercises were involved only the diaphragm and the intercostal muscles. But the task of these two types of exercises had a common indicator – increasing exhalation.

At the beginning of physical therapy the patients with osteochondrosis of the LCRS were recommended isometric exercises, which are conducted without holding breath and pushing. The purpose of their prescribing was to improve blood circulation of the skeletal muscles and the spine, prevent muscle malnutrition, increase muscle strength and reduce the load on the spine [8; 9]. The next step in the majority of the patients was prescribing active dynamic (isotonic) exercises with lighter starting position. The most latest were prescribed active isotonic exercises with the initial standing position [10]. After the restorative treatment in outpatient basis all the patients of the EG were recommended to continue the therapeutic exercises up to 3 months at home.

In the second research of the patients on the 10 day of treatment were obtained the following results: in the CG VAS index was $1,91 \pm 0,41$ ($p \leq 0,05$), when conducting the Lasegue symptom pain arose when lifting the lower limb up to $57,95 \pm 2,42^\circ$ ($p \leq 0,05$), the positive Neri and Dezheryn symptoms were found in 36,4 % and 45,5 % of the patients in this group, respectively. In the EG on the 10 day of treatment were recorded the following data: VAS = $1,27 \pm 0,32$ ($p \leq 0,05$); when conducting the Lasegue symptom pain arose when lifting the limb up to $63,86 \pm 3,41^\circ$ ($p \leq 0,05$), the positive Neri symptom was recorded in 27,4 % of the patients, the positive Dezheryn symptom – in 36,4 %. In the analysis of the received indicators was found that VAS indicators, which were found in the 1 day of the research, were statistically significantly different in both groups ($p \leq 0,05$) from VAS indicators, which were obtained on the 10 day of the research. A similar situation exists with the results, which were recorded during conduction the Lasegue symptom: the received data on the first day were statistically significantly different ($p \leq 0,05$) from the defined results on the 10th day of treatment. Also values of these two indicators on the 10-th day of the research in the patients from the EG were statistically significantly lower ($p \leq 0,05$) to corresponding indicators in the patients from the CG. General dynamics of VAS parameters and pushing symptoms are shown in table 1.

Table 1

Trends in the VAS Indicators and Pushing Symptoms in the Patients with Osteochondrosis of the LCRS

Indicators	1-st Day		10-th Day	
	CG	EG	CG	EG
VAS	6,05±0,373 (p ≤ 0,05)	5,91±0,384 (p ≤ 0,05)	1,91±0,41 (p ≤ 0,05)	1,27±0,32 (p ≤ 0,05)
The Lasegue symptom (lifting angle of the limb when pain arose), ⁰	48,55 ± 2,77 (p ≤ 0,05)	49,14±3,07 (p ≤ 0,05)	57,95° ± 2,42° (p ≤ 0,05)	63,86°±3,41 ° (p ≤ 0,05)
The Neri symptom, %	86,3	81,8	36,4	27,4
The Dezheryn symptom, %	75	79,5	45,5	36,4

Conclusions and Perspectives for Further Research. A comparison of efficiency using only medical treatment of osteochondrosis of the LCRS with a combined therapeutic approach. It was established that the combination of medical treatment and therapeutic exercises is more effective for reducing the intensity of pain syndrome and pathological manifestations of neurological symptoms in osteochondrosis of the LCRS, than using only medical treatment. Further research is expected to be conducted to learn the features of locomotor function recovery of the LCRS using anti-gravity techniques.

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