

Factors determining the direction of the process of physical rehabilitation of men with osteochondrosis of the lumbar spine in remission

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Purpose: identify relationships based on the results of clinical, biomechanical and functional data to identify the main factors influencing the nature and direction of the process of physical rehabilitation of men with osteochondrosis of the lumbar spine in remission.

Material & Methods: analysis of special scientific and methodical literature; content analysis of medical records, results of computer tomograms and radiographs; clinical research methods; pedagogical research methods; biomedical research methods; computer photometry; methods of mathematical statistics. In the analysis of medical records ($n=60$), data of men of the second adult age were used with a diagnosis of osteochondrosis of the lumbar spine in the stage of incomplete and complete remission.

Results: representatives of the studied population constitute a level of pain in visual analogue scale (VAS) below the average, and during periods of exacerbation of the disease, this indicator is above 50%. After testing the musculoskeletal system according to the method of A. V. Vasilenko, a result was obtained that corresponds to a low level. During the Romberg test, a tendency to a decrease in vertical stability was observed, which may be due to the increased angles of the biogeometric posture profile. During the analysis of heart rate variability, the mode amplitude index in the examined population was $78,1 \pm 5,5\%$ ($\bar{X} \pm S$), which indicates the prevalence of moderate sympathicotonia.

Conclusion: in the course of factor analysis, four factors were identified that affect the nature and direction of rehabilitation measures and describe 77,33% of the total variance. The most informative and significant indicators for this category of patients, which characterize each factor, were determined.

Keywords: physical rehabilitation, spinal osteochondrosis, factors.

Introduction

Functional disorders and degenerative-dystrophic diseases of the musculoskeletal system (MSS) remain an important social problem and have significant economic consequences (Yu. N. Furman, S. M. Afanasyev, 2017) [2; 9]. According to the World Health Organization (WHO), spinal osteochondrosis suffers from 40% to 80% of the world's inhabitants. The proportion of clinical neurological manifestations of spinal osteochondrosis among diseases of the peripheral nervous system is 67–95% (J. S. Will et al., 2018) [12]. Chronic back pain is one of the most acute medical and social problems, causing enormous economic damage to society. It should be noted that, despite the fact that in about 70% of patients, the pain under the influence of treatment goes away in a relatively short time - from several weeks to a month, in patients of working age, it usually takes on chronic recurrent (C. B. Oliveira et al., 2018) [10].

Extremely high prevalence of vertebral pain syndromes, according to WHO experts, has reached epidemic proportions, in most cases associated with increased information and stress loads on a person, as well as hypokinesia (M. J. Stochkendahl et al., 2018) [11].

Being an interdisciplinary problem, spinal osteochondrosis is at the intersection of the interests of many specialists, and in

the last decade has become the source of an almost unlimited amount of scientific research, including in the field of physical rehabilitation (O. B. Lazareva, 2013) [6].

In recent years, non-drug methods are increasingly used in the treatment of dystrophic diseases of the spine and their reflex manifestations [3], but the question of what actions and their combinations are more rational to use depending on the clinical manifestations of osteochondrosis is still debatable. that determines the special significance of psychological factors in eliminating chronic back pain [5].

So, the work of A. Samoshkin, N. Moskalenko (2017) is devoted to the analysis of modern ideas about the effectiveness of physical exercises on the Pilates system in osteochondrosis of the lumbar spine of the spine in women [8]. The study of domestic and foreign literary sources that highlight the results of the scientific evidence-based practice of using Pilates exercises showed, on the one hand, the feasibility of their inclusion in comprehensive programs for the physical rehabilitation of women with osteochondrosis, on the other – the need for further study of their effects not only on pain syndrome, but also on other functions of the musculoskeletal system, the violation of which is characteristic of this pathology.

In the study of B. G. Antonevich, E. Yu. Alekseenko (2017), a study was conducted on the use of stretching in a physical

rehabilitation program for men 40–50 years old with degenerative-dystrophic spinal lesions in the lumbar region at the outpatient stage [1]. The authors, after analyzing the characteristics of stretching exercises in patients with degenerative-dystrophic lesions of the lumbar spine at the outpatient stage, recommended stretching various muscle groups, resulting in patients having less pain, increasing the amplitude of spinal movement, and strengthening the muscular corset and improving the quality of life of patients.

D. V. Popovich et al. (2017) determined the effectiveness of the impact of physical rehabilitation tools, the integrated use of improved methods of therapeutic massage, a complex of therapeutic gymnastics static-dynamic exercises and exercises on the Evminov board on patients with osteochondrosis of the cervicothoracic spine [7]. The authors argue that the integrated use of improved elements of therapeutic massage, exercises on the Evminov board and the complex of therapeutic gymnastics of static-dynamic exercises significantly increased the effectiveness of rehabilitation for both initial and clinically pronounced neurological manifestations of vertebral osteochondrosis.

However, despite the large amount of theoretical and practical work devoted to various aspects of physical rehabilitation of people with osteochondrosis of the lumbar spine, there are currently no data on indicators that will play a key role in the rehabilitation process of the thematic cohort of patients, and determined the relevance of this work.

Purpose: identify relationships based on the results of clinical, biomechanical and functional data to identify the main factors influencing the nature and direction of the process of physical rehabilitation of men with osteochondrosis of the lumbar spine in remission.

Material and Methods of the research

To achieve this goal, the following research methods were used: analysis of special scientific and methodological literature; content analysis of medical records, results of computer tomograms and radiographs; clinical - quality of life assessment; pedagogical – stating and forming pedagogical experiment, observation, testing; biomedical methods – heart rate variability, the method of determining the physical state according to the formula of A. A. Pirogovoi, the method of assessing the adaptive potential of R. M. Baevsky, the method of assessing physical performance; computer photometry; mathematical statistics methods.

In the analysis of medical records ($n=60$), data of men of the second adult age were used with a diagnosis of osteochondrosis of the lumbar spine in the stage of incomplete and complete remission. The average age of the subjects was $38,6\pm 2,76$ years ($\bar{X}\pm S$).

It should be noted that in the studied groups of men with osteochondrosis of the lumbar spine, patients with different types of posture were detected, in turn, is one of the factors in the development of this pathology, the occurrence of non-optimal load distribution in the intervertebral discs and reflex deformities. In accordance with this, from the general group we distinguished two subgroups of patients: a subgroup with a disorder in the sagittal plane – patients with increased cyphosis and flattened lordosis, and also a subgroup of pa-

tients with combined disorders in the frontal plane and sagittal plane. The analysis of patients in the selected subgroups made it possible to clarify the specifics of physical rehabilitation programs, taking into account the nature of violations of the static and dynamic stereotype.

All patients were informed about the goals and methods of the study and provided written consent. In conducting the study, they adhered to the issues of medical ethics and the principles of the Helsinki Declaration, adopted by the General Assembly of the World Medical Association (1964–2000), the Council of Europe Convention on Human Rights and Biomedicine (1997).

Results of the research

As the most typical, the average level of pain on the four-syllable visual analogue pain scale (VAS) patients noted $2,72\pm 0,42$ cm ($\bar{X}\pm S$) with the maximum possible 10 cm, which would correspond to unbearable pain. In the best periods of the disease, patients reported pain at $1,57\pm 0,49$ cm ($\bar{X}\pm S$). During relapses, the level of pain in patients reached $5,8\pm 0,8$ cm.

Based on these results, it can be concluded that mainly representatives of the studied population constitute a level of pain below the average, and during periods of exacerbation of the disease, this indicator is above 50%.

After conducting the primary testing of the locomotor apparatus in accordance with the survey method A. V. Vasilenko, the result was $65,7\pm 1,6$ points ($\bar{X}\pm S$), which corresponds to a low level [4]. During the execution of the Romberg test, a tendency towards a decrease in vertical stability was observed, which may be due to increased angles of posture biogeometric profile.

During the analysis of the variability of the heart rate, the amplitude of the mode in the examined contingent was $78,1\pm 5,5\%$ ($\bar{X}\pm S$), which indicates the prevalence of moderate sympatheticone. These data are confirmed by indicators of the tension index of regulatory systems (TI), which is $541,5\pm 77,7$ conv. units, which indicates pronounced sympathicotonia. At the same time, the activity index of the sympathetic nervous system (LF wave) is $70,4\pm 7,9\%$, the activity index of the parasympathetic part (HF wave) – $20,2\pm 4,9\%$. The LF/HF ratio is $3,7\pm 1,1\%$, which indicates a temporary mobilization of the body. The level of physical condition at the beginning of the experiment was $0,599\pm 0,071$ conv. unit ($\bar{X}\pm S$), which corresponds to the average level of the functional state. The indicator of the PWC_{170} test for participants in the experiment was $470,3\pm 30,6$ $\text{kgm}\cdot\text{min}^{-1}$, which corresponds to a low level of functional status. The indicator of adaptive capacity at the beginning of rehabilitation is $2,6\pm 0,1$ conv. unit, which corresponds to the state of functional tension.

Based on the analysis of quantitative indices of posture biogeometric profile, two subgroups were formed: faces with combined posture disturbances in the sagittal and frontal plane – 52% ($n=31$) and persons with disturbances of posture in sagittal plane – 48% ($n=29$). All studied angles characterizing the posture in the frontal plane in the subgroup with combined pathology exceed the values admissible in norm. The angle β_2 , which characterizes the position of the shoulder girdle relative to the horizon, has $4,4\pm 0,3^\circ$, which is 29%

higher than the maximum normal value. The angle α_4 , which characterizes the angle of inclination of the pelvis in the sagittal plane, was $6,24 \pm 0,24$. Thus, we can confirm the presence of increased lumbar lordosis and scoliotic posture disorders in this subgroup. In the subgroup with impaired posture in the sagittal plane, the angle α_2 , which characterizes the thoracic spine, is the most informative in the definition of hypercyphosis, $4,86 \pm 0,52$ at a rate of $2,3^\circ$, and the angle α_4 is $2,05 \pm 0,09$ at the norm is $4,5^\circ$, which is a sign of a smoothed lumbar lordosis. Thus, in the course of previous studies, a large array of data was obtained that characterize the characteristics of the body of men of second adulthood with vertebral pathology. With the help of factor analysis, the most informative indicators were identified in the future used in the work.

In the course of factor analysis, four factors were identified that affect the nature and direction of rehabilitation measures and describe 77,33% of the total variance (Table). The most informative and significant indicators for this category of patients, which characterize each factor, were determined.

Factor structure of the functional potential of the surveyed (n=60)

Factors that determine the functional potential	Factor contribution, %
Factor I – the quality of life associated with pain	28,85
Factor II – the functional state of the spine	18,91
Factor III – components of physical fitness	15,84
Factor IV – physical state	13,73
Total input factors	77,33
Contribution of other factors	22,67

Conclusions / Discussion

Despite the large amount of theoretical and practical work devoted to various aspects of the physical rehabilitation of persons with osteochondrosis of the lumbar spine, data on indicators that will play a key role in the rehabilitation process of the thematic cohort of patients are currently lacking and has

made this work relevant.

In the course of previous studies, a large array of data was obtained that characterize the characteristics of the body of men of second adulthood with vertebral pathology.

During the factor analysis, four factors influencing the nature and direction of rehabilitation measures were identified and describe 77,33% of the total dispersion. The most informative and meaningful indicators for this category of patients are described, characterizing each factor.

It was found that the first factor (28,85% of the total dispersion) is the main one, which characterizes the subjective evaluation of pain sensations (quality of life).

The next factor (the functional state of the spine) has a contribution to the general dispersion of 18,91% and characterizes the deviation of posture in the sagittal plane.

The factor of the components of physical fitness contributes to a general dispersion of 15,84% with factor loadings of indicators characterizing the functional state of the locomotor apparatus.

The fourth factor contributes to the general dispersion of 13,73%, the highest factor loadings in which the indicators characterizing the physical state.

The results of this study, as well as the experience of regenerative treatment, in accordance with the disease and the nature of motor activity, can form the basis for further research, the most characteristic features of the contingent under study, as well as for the development of a progressive rehabilitation program in the remission phase.

The prospect of further research. In the future, it is planned to develop and define the rehabilitation potential of men with osteochondrosis of the lumbar spine, will be based on these factors affecting the rehabilitation process of the thematic cohort.

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