

Kałużna Anna, Leszczyński Kamil, Gałęcki Sławomir, Płoszaj Ola, Kałużny Krystian, Dylewski Michał, Hagner-Derengowska Magdalena, Zukow Walery. The efficiency of stabilization exercises in patients with discopathy in the lumbar spine. *Journal of Education, Health and Sport*. 2019;9(8):1043-1050. eISSN 2391-8306. DOI <http://dx.doi.org/10.5281/zenodo.3463820>  
<http://ojs.ukw.edu.pl/index.php/johs/article/view/7550>

The journal has had 5 points in Ministry of Science and Higher Education parametric evaluation. § 8. 2) and § 12. 1. 2) 22.02.2019.

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The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 05.08.2019. Revised: 31.08.2019. Accepted: 31.08.2019.

## The efficiency of stabilization exercises in patients with discopathy in the lumbar spine

**Anna Kałużna<sup>1</sup>, Kamil Leszczyński<sup>2</sup>, Sławomir Gałęcki<sup>2</sup>,  
Ola Płoszaj<sup>2</sup>, Krystian Kałużny<sup>1</sup>, Michał Dylewski<sup>2</sup>,  
Magdalena Hagner-Derengowska<sup>3</sup>, Walery Zukow<sup>3</sup>**

- 1) Chair and Clinic of Rehabilitation, Faculty of Health Sciences, Nicolaus Copernicus University in Toruń, The Ludwik Rydygier Collegium Medicum in Bydgoszcz
- 2) University of Bydgoszcz
- 3) Department of Spatial Management and Tourism, Faculty of Earth Sciences, Nicolaus Copernicus University in Toruń

Anna Kałużna and Kamil Leszczyński contributed equally to the present work.

Corresponding author: Anna Kałużna - [anna.plaskiewicz@vp.pl](mailto:anna.plaskiewicz@vp.pl)

### Abstract

**Aim of the study:** The aim of the study was to assess the influence of stabilization exercises on the intensity of pain and the results of the FMS test in patients with lumbar spine discopathy.

**Material and methods:** The study included 30 patients (16 women and 14 men) aged from 25 to 68 years ( $\bar{x}=40.6\pm 9.6$ ) with diagnosed discopathy in the lumbar spine. Patients were qualified to be examined by a physician based on the results of imaging tests and information provided in the interview. A control group (reference group) was also created, which qualified 30 healthy people (16 women and 14 men) with average training, which were the most similar in terms of analyzed parameters to the people from the study group. The preliminary examination included functional evaluation with the FMS test and the subjective scale of VAS pain. In addition, each of the study participants filled out their own questionnaire. Then, a 14-day cycle of stabilization exercises was applied to all participants of the study. After completed rehabilitation, the patients underwent functional assessment again with the FMS test and the subjective VAS pain scale.

**Results:** The results of the study have shown that deep muscle training has a significant effect on the reduction of pain in the lumbar spine. Targeted exercises have a positive effect on the improvement of global movement patterns. Studies show that patients' age had a significant impact on final results in FMS tests. The analysis of the conducted research shows that there are no significant differences between the test group and the control group both in the context of perceived pain and results in the final FMS tests. Studies have confirmed that undertaking regular physical activity has a positive effect on the functional status of patients.

**Conclusion:** Stabilization training in patients with diagnosed discopathy in the lumbar spine has a positive effect on reducing back pain and functional status.

**Key words:** discopathy; lumbar spine.

## **Introduction**

Over the past few decades, significant civilization progress can be observed, and hence, increasing lifestyle changes among the population of developed countries. The ubiquitous rush, stress, and increase in the intensity of life have forced the reduction of time spent on physical activity, relaxation and regeneration. Paradoxically, the increase in the pace of life did not result in an increase in the physical activity of the average person. On the

contrary, a significant part of the population both works and rests only in a sitting position. As a result, today, musculoskeletal diseases occupy the third place among the troubles affecting middle-aged people and constitute half of the diseases of chronic people over 50 years of age. Pain in the spine in the lumbosacral segment are among the most common human problems associated with the disorder of the structure and function of the musculoskeletal system. [1-5]

One of the main causes of disorders of the spine function are lesions within the intervertebral discs (discopathy - the most common disease with involvement or damage to the structures of the nervous system). Vertebral discs perform a very important function from a biomechanical point of view. They can be compared to cohesive and at the same time flexible cushions, on which the stems of subsequent vertebrae rest. [1-5]

Under the term discopathy there are broadly understood pathological changes within the intervertebral disc. An important feature of these changes is dehydration or dehydration of the intervertebral disc. The reason for this condition can be e.g. overload and aging of the body, adding up micro injuries or even birth defects within the spine. [1-5]

Intervertebral disc disease requires a thorough diagnostic process and a well thought out and complex rehabilitation process. The main component of this process is appropriate diagnosis, targeted kinesitherapy (i.e. strength training) as well as preventive measures against subsequent injuries. Some cases undergo surgery. [1-5]

### **Aim of the study**

The aim of the study was to assess the influence of stabilization exercises on the intensity of pain and the results of the FMS test in patients with lumbar spine discopathy.

### **Material and methods**

The study included 30 patients (16 women and 14 men) aged from 25 to 68 years ( $\bar{x}=40.6\pm 9.6$ ) with diagnosed discopathy in the lumbar spine. Patients were qualified to be examined by a physician based on the results of imaging tests and information provided in the interview. A control group (reference group) was also created, which qualified 30 healthy people (16 women and 14 men) with average training, which were the most similar in terms of analyzed parameters to the people from the study group. The preliminary examination included functional evaluation with the FMS test and the subjective scale of VAS pain. In addition, each of the study participants filled out their own questionnaire. Then, a 14-day

cycle of stabilization exercises was applied to all participants of the study. After completed rehabilitation, the patients underwent functional assessment again with the FMS test and the subjective VAS pain scale.

### **Statistical analysis**

All obtained results were entered into the STATISTICA 13.0 database, and then subjected to statistical analysis using descriptive statistics and using statistical significance tests.

Based on the principles of statistical analysis, all data described using nominal scales, they were presented using bar charts or circular. Non-normal distribution scales and recorded on the ordinal scale were analyzed by nonparametric rank tests such as the Krusk-Walis test and the Mann-Whitney test. Tests recorded on a nominal scale for which statistical analyzes were performed (comparison of the respondents' answers for two questions from the questionnaire) were verified using the Paerson Chi<sup>2</sup> test, and the results are presented as the frequency of occurrence of the analyzed phenomenon (percentage in a given group).

The results in the scope of quantitative parameters (recorded on the ordinal and quotient scale) are presented as minimum and maximum values (min and max) of quartile values (Q1, Me, Q3) as well as mean ( $\bar{x}$ ) and standard deviation (SD).

Significance coefficient of  $\alpha = 0.05$  was used to verify all analyzes, which allowed to consider statistically significant variables at  $p < 0.05$ .

Spearman's correlation test was used for the correlation analyzes. Correlation analysis involves comparing the variables on a quotient scale allowing to determine the relationship of variables with each other. Comparison of variables allows you to determine whether with the change of one feature the other feature changes, and whether they are proportional or inversely proportional to each other.

### **Results**

The results of the study have shown that deep muscle training has a significant effect on the reduction of pain in the lumbar spine. Targeted exercises have a positive effect on the improvement of global movement patterns. Studies show that patients' age had a significant impact on final results in FMS tests. The analysis of the conducted research shows that there are no significant differences between the test group and the control group both in the context

of perceived pain and results in the final FMS tests. Studies have confirmed that undertaking regular physical activity has a positive effect on the functional status of patients.

**Table 1:** Descriptive and statistical analysis of pain level results on the VAS scale before and after training.

Study	n	$\bar{x}$	SD	Min	Q <sub>1</sub>	Me	Q <sub>3</sub>	Maks	Test result	p
before training	30	5,4	1,8	2	4	5,5	7	9	4,623	<b>&lt;0,001</b>
after training	30	4,0	1,7	1	3	4	5	7		

**Table 2:** Descriptive and statistical analysis of the results of the training level on the FMS scale before and after training.

Study	n	$\bar{x}$	SD	Min	Q <sub>1</sub>	Me	Q <sub>3</sub>	Maks	Test result	p
before training	30	9,5	1,7	6	8	9	11	13	4,782	<b>&lt;0,001</b>
after training	30	12,6	2,4	8	11	12	14	19		

## Discussion

The modern model of the "sedentary lifestyle" is a determinant of various diseases of the spine. The most common problems are in the lower section and usually occur in people living in countries with rapid civilization development. This statement is also confirmed in the collective study of the researchers M. Dzierżanowski, P. Maćkowiak, W. Słomko, A. Radzimińska, U. Kaźmierczak, K. Strojek, G. Srokowski, W. Zukow "The influence of active exercise in low positions on the functional condition of the lumbar-sacral segment in patients with discopathy. "One of the most effective ways to minimize pain and restore optimal physical fitness to patients with LS discopathy is exercise and rehabilitation. In the already mentioned study, as well as in Radziszewski's article K. "Physical exercise in treatment of patients with lumbar discopathy." It was recognized that physical activity is one of many but not a sufficient remedy for problems of the lower spine [1,6]

Tumminello N, Silvernail J, Cormack B. in the article "The Corrective Exercise Trap." Also indicate the positive effect of corrective exercises on spinal degeneration. According to the authors, exercises are also a great way to avoid injury and injury. Own research confirms

that regular, focused physical activity is one of the elements that improve overall fitness. In addition, the results show that the age effect of patients on the higher perception of pain is correct. The effects of therapy are also varied depending on the age of the subjects [7]

Considering the problem of pain (including discopathy) in the lower spine, the importance of the transverse abdominal muscle in the stabilization process should be mentioned. Studies show that people suffering from this type of pain work this muscle is disturbed. Hides and co-authors examined a group of patients suffering from long-term lower back pain in the context of the relationship between transverse and multi-sectional muscle activity. It turned out that the inability to maintain normal transverse abdominal tone showed up to 75.6% of those participating in the study. In addition, it was also shown that people who were able to maintain normal muscle contraction were less likely to have problems with the functionality of the divisible muscle. In turn, Ferreira and co-authors stated that people experiencing soreness in the area of the lower spine have a disturbed (delayed) reaction of the transverse muscle under functional load. For the study, Ferrier used an electromyography apparatus. Many of the currently published studies say about the relationship of the above-mentioned phenomena and the simultaneous occurrence of back pain. The observations of Hides and his team may also lead to the conclusion that people struggling with chronic spine problems may have a significant damage to the entire muscular stabilization system.

E. Lederman is of the opinion that therapists overestimate the role of stability training in the process of improving sports performance, preventing injuries and solving problems with the lower spine. He states that many therapists recommend stabilization exercises as a remedy for everything regardless of the cause of the pain. The author claims that there are not enough clinical studies clearly showing such enormous effectiveness of this type of exercise. appointed at the same time to stages where the role of stabilization has not been strictly proven. An example is the analysis of asymptomatic patients with weakness in the abdominal muscles. It indicates that the examined group (number of 400 people) with weak abdominal muscles while no back pain occurs, however the investigator does not question the effectiveness of physical effort. Points to analyzes proving the positive impact of general exercises on patients' health [8]

Dr. W. Prentice and colleagues emphasize the positive impact of corrective and stabilization exercises both in people professionally involved in sports and those who do not

show high physical activity or avoid it at all because of the pain they feel. Scandinavian experts on the subject also talk about the benefits of exercise in patients with chronic lower back pain. However, they indicate that not all of them equally bring the expected results. Unsgaard-Tøndel M., Fladmark A.M., Salvesen Ø. And Vasseljen O. referred to the results before and after the therapy. Therapeutic exercises include: motor control exercises, exercises using your own body weight in a dedicated system of adjustable grips or ropes (i.e. unstable conditions), and general exercises for the lower back. The duration of the study was one year, and the patients examined complained of non-standard spine pains. The study confirmed that regular work with the patient and his physical activity is a stimulus that reduces pain. On the other hand, the study did not provide conclusive evidence that individually selected motion control exercises (controlling motor skills) or slide exercises (using own body weight) exceeded the results of the general exercises used for chronic back pain [9,10]

Unfortunately, the available literature does not have many studies on FMS tests in the context of people with discopathy. Therefore, own research is presented in terms of Functional Movement System can be considered innovative. FMS as a tool to correctly describe the qualitative assessment of traffic is increasingly used and its benefits are increasingly being demonstrated. The FMS method allows you to effectively determine the effectiveness of therapy by means of stabilization exercises in patients with diagnosed discopathy or any people undertaking targeted physical activity. Based on the analysis of own research, however, it can be seen that performing stabilization exercises (or other exercises) will have a positive response in the context of reducing pain and, consequently, improving the quality of life. The training will also help to improve the functional state of the person exercising, which will then serve as prevention against injuries and injuries.

## **Conclusion**

Stabilization training in patients with diagnosed discopathy in the lumbar spine has a positive effect on reducing back pain and functional status.

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