

# Ocena skuteczności terapii u chorych z dyskopatią lędźwiową leczonych metodą McKenziego i Maigne'a

*Assessment of the Therapy Effectiveness in Patients with the Lumbar Degenerative Disc Disease Treated with the McKenzie Method*

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## Streszczenie:

**Wstęp.** Zespoły bólowe krzyża możemy zdefiniować jako szereg dolegliwości związanych głównie z odcinkiem lędźwiowo-krzyżowym kręgosłupa. Za główną przyczynę ich bólu uznaje się choroby krążków międzykręgowych i procesy zwyrodnieniowe. Źródłami bólów krzyża mogą być także struktury anatomiczne kręgosłupa. Leczenie zespołów bólowych krzyża jest leczeniem kompleksowym. Obejmuje kinezyterapię, fizykoterapię i dąży do zmniejszenia bólu, wzmocnienia gorsetu mięśniowego, przywracania zakresu ruchów, wytrzymałości mięśni, właściwej reedukacji wzorców postawy i aktywności ruchowej pacjenta.

**Materiał i metody.** Badaniu została poddana grupa 38 osób z dyskopatią lędźwiową. Pacjentów podzielono na 2 grupy – kontrolną i badaną. Wszyscy respondenci przed przystąpieniem do badań korzystali z różnych form leczenia i przyjmowali leki przeciwbólowe i przeciwzapalne. Grupa badana leczona była metodą McKenziego, natomiast grupa kontrolna korzystała z zestawów ćwiczeń wg Maigne'a. W obydwóch grupach stosowano zabiegi fizykalne. Po wykonaniu ćwiczeń obie grupy wypełniały ankietę dotyczącą leczenia. **Cel:** Określenie wpływu terapii wg metody McKenziego na zmiany stanu funkcjonalnego u pacjentów z dyskopatią lędźwiową. **Wnioski.** Wyniki badań wykazały, że zastosowanie metody McKenziego pozwoliło uzyskać pozytywne efekty w postaci zwiększenia zakresu ruchomości odcinka lędźwiowo-krzyżowego kręgosłupa u wszystkich pacjentów. Ćwiczenia wg metody McKenziego mają wpływ na funkcję stawów obwodowych kręgosłupa. Zastosowanie postępowania fizjoterapeutycznego wg metody McKenziego w badanej grupie wpłynęło na zmniejszenie dolegliwości bólowych kręgosłupa l-s u 100% badanych pacjentów. Stosowanie metody Maigne'a u pacjentów z diagnozowaną dyskopatią lędźwiową kręgosłupa w nieznaczny sposób wpływa na zmianę odczuwania dolegliwości bólowych dolnego odcinka kręgosłupa.

## Słowa kluczowe:

dyskopatia lędźwiowa, terapia wg metody McKenziego, terapia wg Maigne'a

## Abstract

**Introduction.** The lower back pain syndromes can be defined as a series of ailments associated mainly with the lumbosacral section of a spine. The intervertebral discs disorders and degenerative processes are being considered the major cause of these syndromes. A lower back pain may also be caused by the anatomical structures of a spine. The treatment of a lumbosacral pain is always a complex procedure. It includes kinezytherapy, physiotherapy and aims to reduce the pain, strengthen the muscular corset, restore the range of movement, muscle strength, and to re-educate patients in the areas of the correct posture patterns and the physical activities. **Materials and Methods.** In the research participated 38 patients with the diagnosed lumbar degenerative disc disease. The patients had been divided into 2 groups - control group and study group. All the participants, before they took part in the research, had been subjected to various forms of treatment and had been taking pain and anti-inflammatory medications. The study group had undergone treatment according to the McKenzie method, while the control group had applied the Maigne syndrome exercises. Both groups were treated with the physiotherapeutic procedures. After completing the exercises, each group filled out a questionnaire regarding the treatment. **Objective:** To determine the impact of treatment according to the McKenzie method on changes in the functional status of patients with the lumbar degenerative disc disease. **Conclusions.** The research has shown, that the application of the McKenzie method yielded positive results in terms of the increased range of movement within the lumbosacral spine section, in all patients. McKenzie method exercises do have an impact on the peripheral joints of the spine. The physiotherapy treatment according to the McKenzie method, applied in the study group, resulted in a reduction of pain in the l-s spine section, in 100% of patients. The Maigne method application in patients with the diagnosed lumbar degenerative disc disease, only in a mild way alters the patients' sensation of the lower back pain.

## Key words:

lumbar intervertebral discs, McKenzie method therapy, therapy by Maigne

## Introduction

The spine is a movable axis of the torso and neck, located on the dorsal side of the body. It stretches from the base of the skull to the lower end of the torso, and together with the ribs and the breastbone, creates the so-called axial skeletal system. The lumbar vertebrae are located between thoracic vertebrae and sacrum. Unlike cervical vertebrae, the lumbar vertebrae have no openings in the spinous processes and have no articular surfaces for the ribs, which are typical for the thoracic vertebrae. Absence of these two features makes it easy to distinguish the lumbar vertebrae from others. Lumbar vertebral bodies are kidney shaped, with flat top and bottom surfaces. Their openings are usually triangular and small [1]. Traffic accidents and falls from heights are deemed to be the most common causes of spinal injuries. However, the main cause for the degenerative changes and injuries of the spine is the increased mobility of vertebrae in the lumbar spine section [2]. A significant impact would also have too much of a load on the vertebrae. The back pain caused by the degenerative changes is associated with the small nerve branches innervating surfaces of the joints, intervertebral discs and ligaments. Another factor increasing the sensation of pain is the excessive tension of the paraspinal muscles, which in itself may be a cause of pain as well. Lumbar spine section disorders also include the intervertebral discs damages, which occur as a result of degeneration and pathological changes [3]. Due to the overload of the intervertebral disc, the nucleus pulposus is being squeezed out [4, 5]. A damaged intervertebral disc may undergo repair processes. The damaged spot is being filled up with a valueless fibrous tissue, which subsequently calcifies and turns into a bone. In effect, the disc deteriorates and is being replaced with a connective tissue, on the basis of which there occurs a bony connection between the adjacent vertebrae. To the lower back pain can also contribute the spondylolisthesis, i.e. displacement of one vertebra in relation to the axis of the spine. The disc slides off due to the underdevelopment of the upper articular processes of the sacrum, which are not able to prevent the movement of the vertebra L5 [4, 6, 7, 8]. Another, and essentially the primary cause of the lower back pain is the strained spine disorder. This condition may be caused by a long-term neglect, insufficient physical activity, improper posture at work and at rest, weakened postural muscles, which in turn lead to the strain of ligaments, loss of spine stability and the spine degenerative disease [9, 10]. Treatment of the lower back pain syndromes is a complex process. It includes kinezytherapy, physiotherapy and prophylaxis, and it should aim to reduce the pain by decreasing the strain on the locomotor system, strengthening the muscular corset, restoring the range of movement, muscle strength, and proper re-education in the areas of the correct posture patterns and the physical activities of the patients. Among the most popular methods of treatment for the lower back pain syndromes is the McKenzie method, which is based on

knowledge of the pain patterns and on analysis of the symptoms which come up during the interview and the physical examination of a patient. For the treatment of the lower back pain syndromes, the main objectives are reduction of pain, anti-inflammatory action and reduction of muscle hypertonia. Among the physiotherapeutic techniques most commonly used, there are: laser therapy, thermal treatments, cryotherapy local and general, magnetic field, diadynamic currents, TENS, iontophoresis, ultrasound (13).

The objective of this research is to assess the impact of the therapy, according to McKenzie and Maigne methods, on the change in the functional status of patients with the lumbar degenerative disc disease, through verification of the following research hypotheses:

1. The McKenzie method techniques change the mobility of a lumbar spine section.
2. McKenzie method exercises do have an impact on the peripheral joints of the spine.
3. McKenzie method reduces pain in the lower part of body.
4. The therapy according to Maigne's method affects the sensation of pain in the lower part of spine.

### Materials and Methods

The study has been carried out in the Physiotherapy Cabinet in Jędrzejów. In the research participated 38 patients with the diagnosed lumbar degenerative disc disease. The patients had been divided into groups: study and control group. The study group consisted of 9 women (47.4%) and 10 men (52.6%), while in the control group there were 8 women (42.2 %) and 11 men (57.8%). The average age in the study group (McKenzie) amounted to 46.7 years, and in the control group (Maigne) to 47.1 years.

The study group had been treated according to the McKenzie method, while for the control group the Maigne method had been used. During the study, the following tests were administered:

To evaluate the patients' functional status in both groups, we used: Patrick Faber test, SLR test, SLUMP test, VAS pain assessment scale, Maigne exercises, McKenzie protocol. Both groups had been treated with the physiotherapeutic procedures. After completing the exercises, each group filled out a questionnaire regarding the treatment.

### Research Results

Both investigated groups answered the question regarding the subjective assessment of the level of pain being felt before and after the rehabilitation. Before the rehabilitation, the average level of pain in patients treated with the McKenzie method amounted to  $7.16 \pm 0.25$  pts, and in the group treated with the Maigne method it was  $6.79 \pm 0.16$  points. The applied Student's t-test had shown a difference ( $p > 0.05$ ) between the two groups results, after the rehabilitation. Upon completion of the physiotherapy treatment, the average level of pain in the McKenzie group was  $1.89 \pm 0.15$  points, and in the Maigne group  $4.32 \pm 0.17$  points. This result shows, that the pain perceived by the patients treated with the McKenzie method **decreased significantly more than it was a case with the patients treated with the Maigne rehabilitation method.**

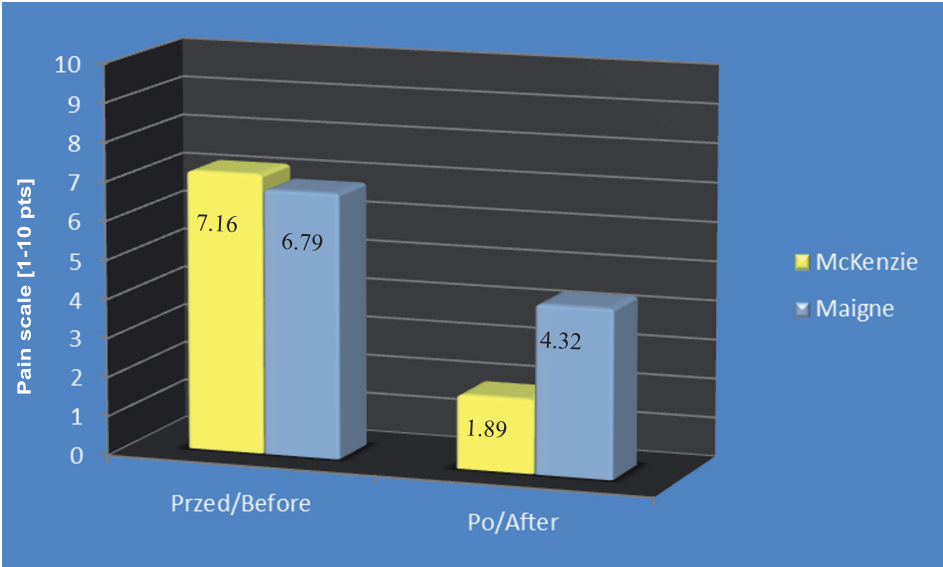


Fig. 1. Comparison of the average level of pain sensation intensity before and after rehabilitation

Table 1. Statistical analysis of pain perception for the two groups before the rehabilitation

	Study group	Control group
Arithmetic mean value of perceived pain (VAS scale)	7.2	6.8
Standard deviation	1.12	0.71
Statistical significance p	0.005	
Value of test statistics t	1.25	

Otrzymane średnie dwóch badanych grup w poziomie odczuwanego bólu występującego przed rehabilitacją nie różnią się, są sobie równe.  
The mean perceived pain level values for the two investigated groups do not differ, they are equal.

Table 2. Statistical analysis of pain perception for the two groups after the rehabilitation

	Study group	Control group
Arithmetic mean value of perceived pain (VAS scale)	1.89	4,31
Standard deviation	0.65	0.74
Statistical significance p	0.05	
Value of test statistics t	-10.52	

The result means, that the differences between the two mean values of the pain level perception, in the two groups, are statistically significant.

Patients in the two groups were subjected to the Patrick Faber's test, both before and after the rehabilitation. Before the rehabilitation, the test result was positive in 89% of the McKenzie patients, and after the rehabilitation it was negative in all the patients. In the control group, 100% patients were tested positive before the treatment. And after the rehabilitation, in 47% of patients the test gave the negative result.

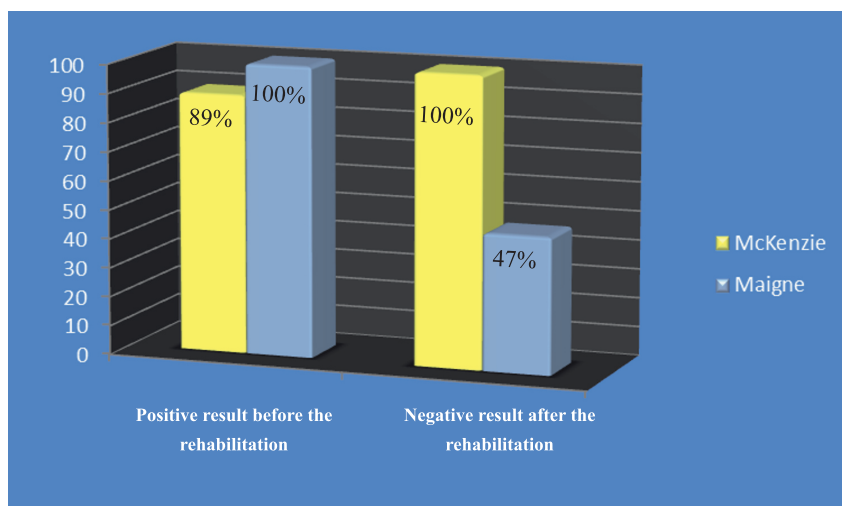


Fig. 2. Patrick Faber Test Results

Table 3. Statistical analysis of the two groups with the positive Patrick Faber test result before rehabilitation

	Grupa badana Study group	Grupa kontrolna Control group
Arithmetic mean in patients with the positive Patrick Faber test result	0.89	1
Standard deviation	0.32	0
Statistical significance p	0.05	
Value of test statistics t	-0.67	

On the basis of the obtained test statistics t, we can establish that the determined mean values for the two groups do not differ from each other, they are equal

Table 4. Statistical analysis of the two groups with the negative Patrick Faber test result after rehabilitation

	Study group	Control group
Arithmetic mean in patients with the positive Patrick Faber test result	1	0.47
Standard deviation	0	0.513
Statistical significance p	0.05	
Value of test statistics t	4.42	

The obtained test statistics t value means, that there is a statistically significant difference between the two mean values of the number of persons, who had the negative Patrick Faber test result after they had been rehabilitated



63% of patients in the control group had not undergone the proper SLR test, but after the rehabilitation this rate dropped to 11%. And in the study group 58% of the patients tested positive, and after the rehabilitation all of the patients had the negative test result.

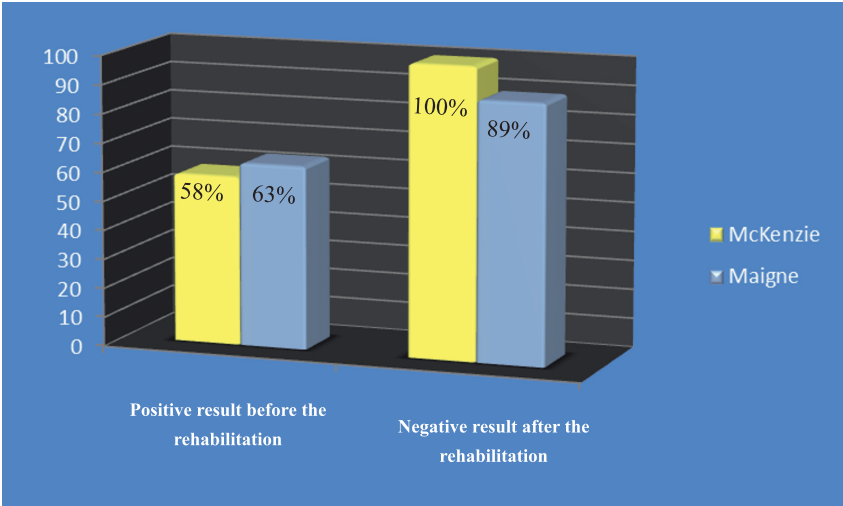


Fig. 2. SLR Test Results

Table 5. Statistical analysis of the two groups with the positive SLR test result before rehabilitation

	Grupa badana Study group	Grupa kontrolna Control group
Wartość średniej arytmetycznej osób z objawem dodatnim w teście SLR Arithmetic mean in patients with the positive SLR test result	0.58	0.63
Odchylenie standardowe Standard deviation	0.51	0.49
Poziom istotności p Statistical significance p	0.05	
Wartość statystyki testowej t Value of test statistics t	-0.29	

The determined mean values for the two investigated groups, which had the positive SLR test result, do not differ statistically from each other, they are equal

Table 6. Statistical analysis of the two groups with the negative SLR test result after rehabilitation

	Study group	Control group
Arithmetic mean in patients with the positive SLR test result	1	0.89
Standard deviation	0	0.32
Statistical significance p	0.05	
Value of test statistics t	1.43	

Porównując wartość testu t do wartości obszaru krytycznego dla poziomu istotności 0,05 i 36 stopni swobody możemy stwierdzić, że otrzymane średnie nie różnią się, są sobie równe  
Comparing the the t-test value to the critical region for the significance level of 0.05 and 36 degrees of freedom, we can conclude that the resulting mean values do not differ, they are equal

Due to the fact that all the patients participating in the study, within both the control and the study group, had the negative result of the SLUMP test after the rehabilitation, therefore the statistic t-test value equals zero.

All the patients participating in the study, in both groups, were tested negative after they had completed the rehabilitation.

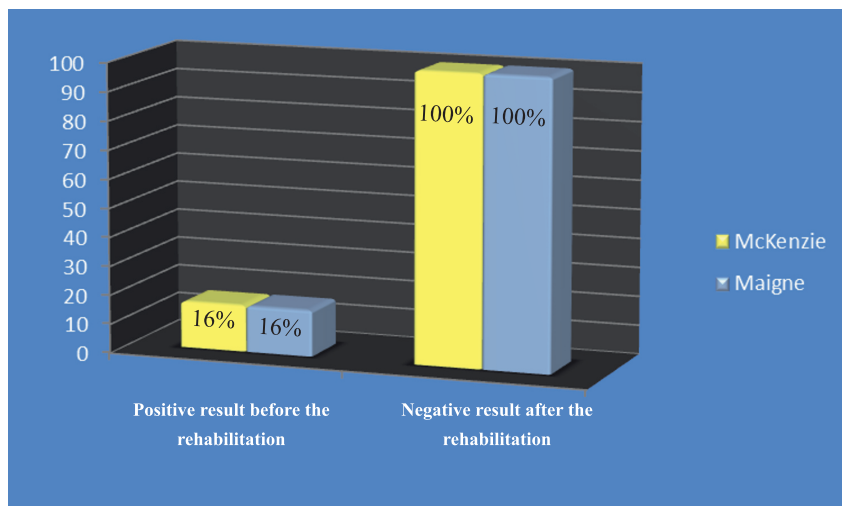


Fig. 4. SLUMP Test Results

Figure 5 shows progress of the rehabilitation in the control group, which for 10 days had been doing exercises according to the Maigne method. During the first three days all the patients were doing exercises of the first series, and on the sixth day already eight patients went on with exercises of the second series. On the last day of the rehabilitation process, two patients did exercises of the third series, and only one person exercises of the first series.

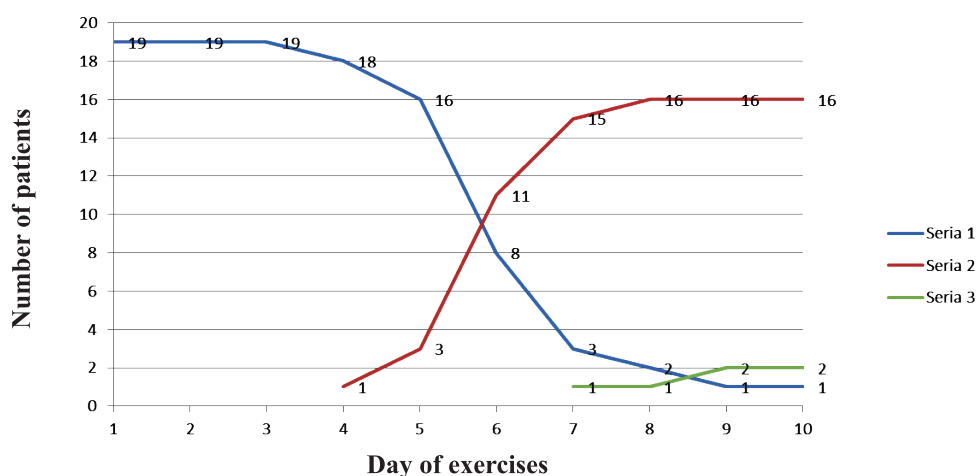


Fig. 5. The course of the exercises according to the Maigne method

### Discussion.

The lower back pain syndromes are a major medical and social issue and, within the working population, they are one of the main reasons for the long-term work incapacity. According to many authors, some 60 to 90% of the adult population experience the problem at least once in a lifetime. These ailments very rarely occur as a one time episode, and more often than not they are of a chronic nature, with varying severity and duration of remission periods [14, 15, 16, 17]. Adamczyk et al. believe, that all the anatomical structures of a spine may be the source of the lower back pain (11). For the purpose of this study, the patients were being diagnosed with the technique described by McKenzie. In numerous publications, both Polish and foreign, this method is being considered a good way to diagnose the spine pain disorders [18, 19]. In our study, we observe the statistically significant reduction in the subjective pain sensation, according to the VAS scale, as well as the improved spinal mobility. In patients from the McKenzie group, before the rehabilitation, the mean pain sensation level was 7.16 pts, and after the treatment it decreased to 1.89 pts, which indicates efficiency of the McKenzie method. Similar results have obtained in their study Nitera-Kowalik et al., where the McKenzie treatment method contributed to a rapid reduction of pain, which had convinced the patients to collaborate and had a positive impact on the therapy results. Before the therapy, 25% of the patients categorized their pain as severe and only 5% as mild. After three weeks of treatment, 70% of the group had described their pain as mild and the remaining patients felt no pain at all [20]. Petersen et al. in their study, attempted to verify the McKenzie method in patients with the low back pain in subacute and chronic stage, persisting longer than a few months. The study shows, that after eight months of the McKenzie method application, an improvement in the perception of pain has been observed in both groups [21]. Busanich et al. have demonstrated in their research, that the McKenzie treatment method proves to be more effective in the lowering of pain intensity sensation if compared to the standard therapies, such as non-steroidal anti-inflammatory drugs, educational brochures or massage of a spine (22). In addition, the results analysis in the Lisińska and Rissop-Gierszewska research does prove, that the intensity of pain and the range of its radiation, in the group applying the McKenzie method exercises, have changed significantly, i.e. 33.3% of the patients categorized their pain as moderate (from 4 to 6 pts on the VAS scale), while all the others described their pain as mild (1 to 3 pts on the VAS scale) (23). And in the control group, which has been applying the Maigne method exercises, the difference in the level of pain sensation has amounted to 2.47 pts. Among similar studies, proving that Maigne relaxation exercises eased the pain associated with the lumbosacral degenerative disc disease, there are theories by Zanna Fiodorenko-Dumas and Anna Kołcz-Trzęsicka [24].



However in their work, they have achieved the positive results not only by applying the aforementioned relaxation methods, but combined them with other kinezytherapeutic exercises, like: functional gymnastics on mattresses in low positions, gymnastics with balls and active mobilizing of the spine in the supported kneeling position.

According to the published studies, patients with pain in the lumbosacral spine section often have their paraspinal muscles weakened, which leads, in turn, to the loss of control over the precise movements [25]. The chronic back pain disorders cause the impairment of the longest and the multifidus muscles, which take part in the torso muscles activities, and that contributes to the significant workplace absence figures [26]. Analysis of the carried out research shows, that the Patrick Faber test confirmed the diagnosis of the sacroiliac joints blockage and the dysfunctions in the lumbar spine area. The positive test result occurred in 89% of the study group, and after the rehabilitation all the patients tested negative. The effectiveness of the McKenzie method, in terms of the hip joint loss of mobility, has been confirmed by the results presented in the study by Nitera-Kowalik et al. The research carried out by the above-mentioned has shown, that application of the McKenzie method in patients with the back pain syndrome yielded very noticeable improvement of the mobility range in the lumbar spine section, i.e. before the treatment half of the participating patients showed a moderate level of impairment, and after the treatment the patients' quality of life has changed and  $\frac{3}{4}$  of them showed only minimal impairment [20]. Skikic et al. also have shown a positive impact of the the McKenzie treatment method on the mobility improvement of the lumbar spine section and the pain reduction and its centralization. After the McKenzie exercises, the satisfactory difference in the mobility during hyperextension and bends to the right and to the left have been archived [27]. As a result of the McKenzie method application, other pain characteristics, like pain location and range of its radiation, also have been modified. Before the treatment, half of the study group placed their pain as radiating to their lower limb, which had been confirmed by the administered SLR and SLUMP tests. After the therapy, all the patients had negative results in both tests, which means that the radiation of pain had been significantly reduced and which confirms the phenomenon of pain centralization. Donelson et al. also observed the pain centralization phenomenon in the group they studied. On the basis of the results obtained, the authors have found the McKenzie's method of diagnosis valuable, and the treatment results encouraging. After the treatment, only 50% of 74% of the patients complained on the pain radiation [28].

During the in-house research, the patients most often pointed out lifting of heavy objects and bending as the most common causes of the pain. After the rehabilitation, only one person felt pain when bending, while 63% of the patients did not complain about pain when lifting. On the other hand, in the

research by Demczyszak the sitting position has been identified as the most common cause of pain, after the rehabilitation however, in all the patients the pain sensation decreased [28].

The presented studies show very significant differences between the standard rehabilitation model, based on the physiotherapy, and the opportunities offered by the McKenzie method. The method is all the more effective, because the patients can do the exercises not only in the physiotherapy cabinets, but also at home and at work. Application of the MDT offers the wide possibilities of the differential diagnosis, and makes it possible to avoid the unnecessary surgical procedures, which expose the patient to a huge stress and to necessity of a long rehabilitation process. And yet, the key issue in the medical treatment and the physiotherapy is a patient's wellbeing.

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## Conclusions

1. The effect of the McKenzie method application in the treatment of the spinal pain syndromes is the expanded mobility range of the lumbosacral spine section, which has been confirmed by the SLUMP test results.
2. Evaluation of the sacroiliac joints functions, by means of the Patrick Faber and the SLR tests, have shown that the McKenzie method eliminates the limitations occurring in this joint, in the lower back pain syndrome cases.
3. The rehabilitation treatment according to the McKenzie method, resulted in the study group in reduction of the spinal pain intensity.
4. The therapy according to the Maigne method, in patients with the diagnosed lumbar degenerative disc disease, to a lesser degree alters the patients' sensation of the lower back pain.

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