

## MULTIMODAL REHABILITATION TREATMENT OF PATIENTS WITH SCIATICA

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Sciatica is pain that spreads from the lower back to the lower extremity below the knee. The aim of this study was to determine the effect of multimodal rehabilitation treatment on patients with sciatica.

The research included 51 subjects who were treated at the Clinic for Medical Rehabilitation of the Clinical Center of Vojvodina for chronic sciatica. Next to demographic data, we also gathered results from Numerical Rating Scale, The Oswestry Disability Index, Central Sensitization Inventory and Fear Avoidance Component Scale. Results were obtained at the start and at the end of the treatment.

The majority of the patients were women (34 (66,7%)). The duration of the stationary multimodal treatment of chronic pain was 20,48±5,89 days. The pain intensity measured by NRS had significantly lowered after the treatment (6,49±2,22 vs 5,00±2,22, t=5,629, p<0,001). Average ODI score (48,75±15,16 vs 42,24±14,13 (t=4,246, p<0,001), as well as FACS score (66,80±14,13 vs 62,47±16,49, t=2,086, p=0,042) had significant improvement after the treatment. The CSI score improved after the end of the treatment, but this difference did not reach statistical significance (t=1.446; p=0.155).

Stationary multidisciplinary rehabilitation treatment leads to an improvement in the functional status of patients, a reduction in the level of activity avoidance due to fear, and a reduction in pain intensity.

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### Introduction

Sciatica is a pain that spreads from the lower back to one or both lower extremities below the knee. Usually, sciatica is caused by nerve root compression. Neuroradiological studies confirm that 85% of sciatica cases are related to intervertebral disc disorders (1). The most commonly affected are the L5 and S1 nerve roots, somewhat less often L4 nerve root.(2).

However, there are other possible causes of sciatica, such as traumatic injury of the sciatic nerve, muscle hematomas, tumors, piriformis syndrome and myofascial pain syndrome (3-6).

Treatment of sciatica presents a major challenge for medical professionals and the health care system in general (7). Current approaches recognize the value of a multimodal treatment that focuses not only on nociceptive aspects of pain, but also on cognitive-evaluative and motivational-affective aspects (8). Evidence-based multimodal treatment of sciatica represents a significant advance in the treatment of this condition (9,10). Multimodal treatment consists of a combination of pharmacological and non-pharmacological therapy, which includes the use of physical therapy, psychological and cognitive-behavioral therapy. A multimodal approach more adequately and comprehensively manages pain at the molecular, behavioral, cognitive and functional levels (11). These approaches have been shown to lead to superior and long-lasting outcomes, including pain perception, mood, restoration of physical functioning, work status and medication use (12).

Pharmacological therapy begins after an accurate diagnosis. A key component of drug pain management is finding a balance between desired effects and acceptable side effects. Long-term use of painkillers in the treatment of sciatica may be associated with unpredictable efficacy, reduced

tolerance to drug effects, and potential more serious side effects (3,13).

In the case of non-pharmacological therapy the importance of physical medicine and rehabilitation, which contributes to the improvement and maintenance of physical functioning and a better quality of life of the patient, is particularly emphasized. Physical therapy mainly focuses on kinesitherapy and electrotherapy modalities. Electrotherapy procedures in sciatica are primarily intended to reduce the intensity of pain, relax muscle spasm, prevent muscle atrophy, increase local blood circulation, as well as maintain and increase range of motion (14).

Clinical guidelines recommend the provision of 'encouragement to stay physically active'. Moreover, bed rest is not recommended (15). Physical activity is a key element in the treatment of chronic pain conditions. Various types of exercise have been proven to reduce pain, improve physical functioning and quality of life in patients with chronic pain. The use of aerobic exercises has positive effects on pain modulation, nutrition of the intervertebral disc and the mechanics of the spinal column itself (16). Great attention is paid to hydrokinesitherapy, because water, with its mechanical and thermal properties, has a beneficial effect on the musculoskeletal system (17).

In addition to reducing the perception of pain, exercise has an impact on mental health, improves mood, reduces stress and depression that are often associated with chronic pain conditions (18,19).

The aim of this study was to determine the effect of multimodal rehabilitation treatment on patients with sciatica.

### Material and methods

The research was designed as a prospective case study, conducted at the Medical Rehabilitation Clinic of the University Clinical Centre of Vojvodina and included patients who were treated between September 1st and December 1st, 2018 for chronic sciatica.

Chronic sciatica is defined as pain in the lower back that spreads to one or both lower extremities below the knee level for more than six months.

Inpatient multimodal treatment was consisted of drug treatment and physical therapy. Drug therapy was prescribed by the physician who managed the patient's treatment. Physical treatment was consisted of: therapeutic exercises that are routinely carried out at the Medical Rehabilitation Clinic (exercises to increase muscle strength, improve balance and coordination,

increase flexibility and muscle tone), therapeutic modalities (interfering currents, magnetotherapy,

laser therapy, sonophoresis, etc.), hydrotherapy and ergonomic education of patients.

In the present study 51 patients were included in the research. The criteria for inclusion in the research were: the presence of sciatica, the age of the subjects 18 years and older. Criteria for exclusion from the study: subjects under 18 years of age, presence of malignant disease, pain that lasted less than 3 months, patients who had spine surgery in the last 6 months, patients who did not understand the Serbian language. The research was approved by the Ethics Committee of the University Clinical Center of Vojvodina (No 00-28/864).

We obtained data on age, gender, level of education, duration of pain, duration of inpatient multimodal treatment. In addition to these data, patients filled out a set of questionnaires that consisted of:

The Serbian version of the Central Sensitization Inventory (CSI-Serb) is designed to show that the symptoms experienced by the patient are related to the central sensitization syndrome. It consists of two parts. Section A provides 25 items related to central sensitization syndrome with a score from 0 to 100. Each item carries a 5-point Likert scale from 0 (never) to 4 (always). Based on section B through 7 questions (not numbered), we learn about the patient's previous diagnoses (restless legs syndrome, chronic fatigue syndrome, fibromyalgia, temporomandibular dysfunction, migraines, irritable bowel syndrome, neck injuries, anxiety and depression) (20-22).

The Serbian version of the Fear Avoidance Component Scale (FACS-Serb), which consists of 20 items to which the respondent answers on a six-point Likert scale from 0 (completely disagree) to 5 (completely agree). The FACS-Serb score can range from 0 to 100, where a higher score indicates a greater degree of activity avoidance (23).

The Oswestry Disability Index (ODI) is used to assess the functional status of patients with lumbar syndrome. There are 10 items to which the respondent answers on a six-point Likert scale from 0 to 5, where 5 indicates the greatest level of activity limitation. The index is expressed in percentages, and a higher value of this index represents a greater degree of limitation in activities of daily life (13,14).

Pain intensity values were collected according to the Numerical Rating Scale (NRS). We examined current pain (at the time of the survey), maximum pain in the past 4 weeks, and average pain intensity in the past 4 weeks. The scale consisted of 11 items ranging from 0 (no pain) to 10 (worst possible pain) (24).

The data were processed with the statistical program SPSS 23 for Windows. Descriptive and inferential statistics methods were used during the statistical data processing. Comparison of numerical data from different groups was

performed using parametric and non-parametric methods. Student's t-test of paired samples was used, categorical data were analyzed using Chi-square. A value of  $p \leq 0.05$  was taken as significant.

## Results

The present study included 51 participants; majority were women (34; 66,7%. The average age of the subjects was  $54.55 \pm 14.74$  years. The youngest patient was 21 years old, while the oldest patient was 80 years old.

The largest number of respondents had a secondary level of education (33 (64,7%)), and the smallest number of them had a tertiary education (3(5.9%)).

Patients reported that the pain lasted an average of 55.65 months, while the duration of inpatient multimodal chronic pain treatment at the Medical Rehabilitation Clinic lasted an average of 20.47 days (Table 1).

**Table 1.** Sample characteristics

	Mean	SD
<b>Starost (godine)</b>	54.55	$\pm 14.74$
<b>Sex (female %)</b>	34 (66,7%)	
<b>Duration of pain (months)</b>	55,65	$\pm 92,85$
<b>Duration of the treatment (days)</b>	20,47	$\pm 5,89$

Table 2 shows the scores of the Central Sensitization Inventory (CSI-Serb), the Oswestry Disability Index (ODI), the Fear-Avoidance Scale (FACS-Serb), as well as pain intensity before and after multimodal treatment. Functional status determined on the basis of ODI ( $t=4.246$ ;  $p<0.001$ , FACS-Serb scores ( $t=2.086$ ;  $p=0.042$ ), as well as pain intensity ( $t=5.629$ ;  $p=<0.001$ ) significantly improved after multimodal treatment at the Medical Rehabilitation Clinic.

The degree of central sensitization symptoms determined on the basis of the CSI-Serb improved after the treatment, but this difference did not reach statistical significance ( $t=1.446$ ;  $p=0.155$ ).

## Discussion

Chronic sciatica is one of the most common pain syndromes in developed countries (16).

Multimodal treatment is defined as the simultaneous use of two or more different therapeutic treatments with different mechanisms of action with a common goal (25). At the Medical Rehabilitation Clinic, multimodal treatment consists of therapeutic exercises, therapeutic modalities, hydrotherapy, and patients also receive drug therapy. Unlike most similar treatments in developed countries, the treatment does not include psychotherapy, so the interpretation of the results is particularly interesting from this aspect.

**Table 2.** Comparison of questionnaire results before and after treatment

	BEFORE TREATMENT		AFTER TREATMENT		t	p
	Mean	SD	Mean	SD		
<b>CSI-Serb<sup>1</sup></b>	38,39	11,97	35,84	15,05	1,446	0,155
<b>ODI<sup>2</sup></b>	48,75	15,16	42,24	14,13	4,246	<0,001
<b>FACS-Serb<sup>3</sup></b>	66,80	14,13	62,47	16,94	2,086	0,042
<b>NRS<sup>4</sup></b>	6,49	2,22	5,00	2,22	5,629	<0,001

<sup>1</sup> Central Sensitization Inventory

<sup>2</sup> Oswestry Disability Index

<sup>3</sup> Fear Avoidance Component Scale

<sup>4</sup> Numerical Rating Scale

The Central Sensitization Inventory is a reliable, valid scale for examining the presence of symptoms of central sensitization (26–31). In our study, an improvement in the CSI score after treatment was shown, but the difference we obtained was not statistically significant. Although there was some indication that the CSI could be used as a tool to monitor the effect of treatment (17) we failed to show that it was significantly different at the beginning and end of treatment. There are probably more reasons for these results. First, it is possible that the CSI is not a suitable instrument for monitoring the effect of multimodal treatment, which in our case was without psychotherapy. Another potential reason could be that CSI is not sensitive enough to detect changes occurring in such a short time interval. In any case, it is necessary to further examine changes in the CSI score in relation to potential treatments, as well as in follow-up studies to determine whether this scale has the potential to be used as a tool to assess the effectiveness of chronic pain treatment (32,33).

The Oswestry index is often used to assess the functionality of patients with lumbar syndrome (34,35). Inpatient multimodal treatment resulted in a significant improvement in the functionality of patients determined on the basis of the ODI. Other authors also found similar improvements after multimodal treatment (36,37). Some authors find that there is a significant improvement, up to 73% of examined patients with chronic sciatica, after physiotherapeutic treatment (28). Although there are significant differences in the content of multimodal treatments, most included psychotherapy (38–40). There are also those who examined the influence of therapeutic exercises (41–43), which was the most similar to our study, so we can assume that in patients with chronic

sciatica, therapeutic exercises are very important for functional improvement.

We should not lose sight of the fact that a significant number of patients with sciatica have a pronounced neuropathic pain component for which they received specific therapy during inpatient treatment, which could also significantly contribute to the functional improvement of these patients (44,45).

Avoidance of activity due to fear is very common in patients with chronic pain (46). The Fear avoidance component scale (FACS) developed by Neblet et al. (2016) has been shown to be a potentially useful tool for assessing this phenomenon (26). Our results showed that there was a significant improvement in the FACS score, and thus a reduction in the severity of this phenomenon after multimodal treatment at the Medical Rehabilitation Clinic. Other authors also observed after treatment a reduction in the level of fear of activity in patients with sciatica that lasted up to 6 months (47). The observed improvement can be attributed to the fact that during the multimodal treatment there was communication with healthcare workers (doctors, physiotherapists, nurses, psychologists), and even patients, which certainly had a "psychotherapeutic" effect. This kind of interaction certainly helped to reduce the fears and doubts they had, which significantly contributed to the phenomenon of avoiding activities due to fear. In a certain sense, this type of communication can be seen as a form of patient education and as such has positive effects in patients with a high level of activity avoidance due to fear (48).

In the work of Childs and colleagues, in almost all patients (82%) with sciatica, after a four-week treatment, a decrease in pain intensity was recorded measured by the Numerical Pain

Scale (49). In our research, positive treatment effects were also observed. This scale showed the best results compared to the other scales, from which we can conclude that the multimodal treatment according to these criteria was successful (50). It could be said that, in addition to the previously mentioned improvements, it was expected that there would also be a decrease in the intensity of pain on the NRS as the most obvious result in the treatment of pain.

The possibility that patients may feel a certain "pressure" from healthcare workers, when assessing the intensity of pain after treatment, shouldn't be excluded. They may state that the treatment had a more favorable outcome, and that the intensity of the pain was reduced more than it was, in order to justify the "effort" that went into their treatment. In our research,

although some patients were interested in the values of the first measurement, they didn't have the opportunity to see the intensity of the pain they reported at the beginning. We must not ignore that the relationship between the healthcare professional and the patient can influence the obtained values and potentially represent a source of error.

### Conclusion

Inpatient multimodal rehabilitation treatment for sciatica patients leads to an improvement in the functional status, a reduction in the level of activity avoidance due to fear and a reduction in pain intensity.

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## MULTIMODALNI REHABILITACIONI TRETMAN PACIJENATA SA LUMBOIŠIJALGIJOM

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**Uvod:** Lumboišijalgija predstavlja bol koji se iz donjeg dela leđa širi u donje ekstremitete ispod nivoa kolena. Cilj ove studije bio je da se utvrdi efekat multimodalnog rehabilitacionog tretmana kod pacijenata sa lumboišijalgijom.

**Materijal i metode:** Istraživanje je obuhvatalo 51 ispitanika lečenih na Klinici za meicnisku rehabilitaciju Kliničkog centra Vojvodine zbog hornične lumboišijalgije. Pored demografskih podataka, prikupljene su i vrednosti intenziteta bola prema numeričkoj skali (engl. Numerical Rating Scale – NRS), vrednosti Oswestrijevog indeksa onesposobljenosti (engl. The Oswestry Disability Index – ODI), vrednosti Skale centralne senzitivacije (engl. Central Sensitization Inventory – CSI) i vrednosti Skale izbegavanja aktivnosti usled straha (engl. Fear Avoidance Component Scale – FACS). Podaci su skupljani na početku i na kraju tretmana.

**Rezultati:** Većinu ispitanika su činile žene, njih 34 (66,7%). Dužina trajanja stacionarnog multimodalnog tretmana hroničnog bola bila je 20,48±5,89 dana. Intenzitet bola na NRS značajno je smanjen nakon tretmana (6,49±2,22 vs 5,00±2,22, t=5,629, p<0,001). Prosečna vrednost ODI (48,75±15,16 vs 42,24±14,13, t=4,246, p<0,001), kao i prosečna vrednost FACS (66,80±14,13 vs 62,47±16,49, t=2,086, p=0,042) značajno je poboljšana nakon tretmana. Skor CSI nije pokazao značano poboljšanje nakon multimodalnog tretmana (38,39±11,97 vs 35,84±15,05, t=1,446, p=0,155).

**Zaključak:** Stacionarni multidisciplinarni rehabilitacioni tretman dovodi do poboljšanja funkcionalnog statusa pacijenata, smanjenja stepena izbegavanja aktivnosti usled straha i smanjenja intenziteta bola.

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**Ključne reči:** lumboišijalgija; onesposobljenost; bol; multimodalni tretman