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Efficacy of rehabilitation in patients with segmental discopathy lumbar-sacral spine

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ABSTRACT

Discopathy of the lumbosacral spine are all pathological changes within the intervertebral disc, causing characteristic clinical symptoms, which mainly include pain in the lower part of the spine, often radiating to the lower limbs but also tingling, numbness and limitation of movements of torso. Treatment of patients with discopathy is usually conservative. Physiotherapy, kinesitherapy and therapeutic massage treatments are used to reduce pain. Subjective evaluation of the effectiveness of the physiotherapeutic procedures used in the group of patients with pain in the lumbosacral spine. The study included 140 people diagnosed with discopathy, attending rehabilitation procedures in Tarnów physiotherapy offices. The research method was a questionnaire of own design supplemented with the VAS scale to assess pain before and after rehabilitation. The data was subjected to statistical analysis. Among the treatments used in the examined group of patients dominated spine and abdominal muscle exercises, therapeutic massage, TENS currents and manual therapy. The average intensity of pain before rehabilitation was = 7.21 points. \pm 1.54 points, while after the rehabilitation it was equal to = 3.44 points. \pm 1.97 points ($p < 0.001$). Outpatient physiotherapy reduced pain in people suffering from discopathy of the lumbosacral spine. Comprehensive use of TENS currents, spine and abdominal muscle exercises, therapeutic massage and manual therapy does not affect the total elimination of pain in the lumbosacral spine, it only allows for their significant reduction. Physiotherapeutic therapy applied in patients with lumbosacral spine discopathy significantly improved their quality of life.

Keywords: discopathy, pain, VAS scale, rehabilitation

1. INTRODUCTION

Painful ailment of lumbosacral spine concerns half of the people all over the world and its most frequent cause is discopathy. It constitutes a serious sociomedical problem, which in Poland affects over 60-90% of society and is classified as a modern civilisation disease [1-4]. Long-term pain in the lower spine and subsequent structural and muscular deformities generate disability in society and many economic consequences for the health system. [5,6]

Discopathy is defined as all pathological changes of the intervertebral disc, which occur most frequently as a result of aging of the organism, spine overextension, injuries, congenital defect, professional work and living environment [7-11]. Apart from pain, other ailments are also experienced by the patients: numbness, tingling, hyperaesthesia, intense muscle tension, pain radiation to the whole lower limb and limited torso movement [12]. Above all discopathy progress is fostered by: limited physical activity, sedentary lifestyle and too dynamic moves, which result in improper overload of motor segments of the spine [13].

In the lumbar spine, there is multifaceted mobility in the intervertebral joints, which significantly contributes to the occurrence of numerous micro-injuries and overloads [14]. Conducting physical activity in the population determines the degree of strain on the spine [15, 16].

Treatment of patients with L-S discopathy is often of preventive character. The most common methods and means include pharmacology of analgesics, but excellent therapeutic results are obtained through the use of physiotherapy treatments: physiotherapy, kinesiotherapy, manual therapy and massage, health education concerning proper ergonomics of work and free time, lifestyle, and physiotherapy [12, 17-21]. Patients are often sent to sanatorium, which combines physiotherapeutic treatment with environmental and climatic factors [15,16].

The main aim of discopathy treatment is to facilitate patients' recovery to physical activity, taking part in professional and social life, as well as preventing pain escalation or recurrence. By well-matched complex rehabilitation one should understand above all strengthening spinal muscles, pain reduction by resting structures in motor segment, correcting bad posture, improvement of spine stabilization and creating good physical function.

However, exercise and physical activity should be the most important principle of a healthy lifestyle, reduce the risk of dysfunctions and deterioration of health [22]. Health education and all other activities related to public health should primarily include the principles of spine biomechanics, emphasize the importance of physical activity as a factor determining the subsequent occurrence of pain, adequate vitamin supplementation, prevention of injuries and a whole range of other preventive activities [23.]

Aim. Subjective evaluation of the effectiveness of the physiotherapeutic procedures used in the group of patients with pain in the lumbosacral spine.

2. MATERIAL AND RESEARCH METHODS

The including in the research factor was the outpatient rehabilitation. The research was conducted among patients of rehabilitation offices. It was anonymous and voluntary.

The research method was a questionnaire of own design supplemented with the VAS scale to assess pain before and after rehabilitation.

The data was subjected to statistical analysis in STATISTICA PL 13.1 program. The assumptions of the conducted tests have been checked. The statistically significant relationship was established at probability value $p \leq 0,05$.

3. RESULTS

The study included 140 people, 72 women and 68 men. The average age of the group was $37,39 \pm 9,34$ (20 - 50 years old). The time length of painful ailment of L-S spine among 47 respondents lasted for over 2 years. In the group of 35 examined patients the pain lasted for over 6 months and among 32 from 3 to 6 months. Only 26 patients suffered from pain for over a year up to 2 years. For most patients the most painful was the movement of bending, lifting objects, sedentary position and longer standing position. (Table 1).

Table 1. Positions increasing painful ailment

Positions increasing painful ailment*	n	%
Bending	80	57,1%
Straightening	31	22,1%
Twist to the right	20	14,3%
Twist to the left	27	19,3%
Sedentary position	72	51,4%
Longer standing position	57	40,7%
Lifting objects	78	55,7%
Other	4	2,9%

Most patients localised pain in the paravertebral section (N = 55; 39,3%), 37 examined felt the radiation of pain into the buttock (26,4%), 29 into the whole lower limb (20,7%), and 19 declared radiating pain into the thigh (13,6%). In most cases the pain was recurring (N = 72; 51,4%). For 27,1% (N = 38) the pain was coming suddenly, while 20% described it as constant. The time span of rehabilitation was different for the examined patients. Most respondents (N = 57; 40,7%) were treated for 10-15 days, 47 people (33,6%) for about 21-30

days and 36 people (25,7%) had the therapy for 16 to 20 days. Most of the examined underwent the therapy regularly and systematically (109 people - 77,9%).

The influence of implemented physical treatment by the respondents on the reduction or elimination of painful ailments was analysed. The patients subjectively assessed the effectiveness of a particular treatment in a four-level scale, in which 0 corresponds to 'did not help' and 3 – 'helping significantly'. Most of the examined did spine and abdomen muscle exercises, used therapeutic massage, TENS currents and manual treatment. Of all the implemented physiotherapeutic methods, that helped significantly, the highest number of points received spine and abdomen muscle exercises ($\bar{x} = 2,27$), therapeutic massage ($\bar{x} = 2,38$) and manual treatment ($\bar{x} = 2,54$). However, the least effective according to the examined patients were diadynamic currents ($\bar{x} = 1,13$) and ultrasound ($\bar{x} = 1,24$) (Table 2). Among the methods that decreased perception of pain was pharmacological therapy (N = 77; 55,0%) and analgic positions (N = 23; 32,1%).

Table 2. Subjective evaluation of impact of selected treatment procedures on reduction or elimination of painful ailment to the lumbosacral spine

Type of treatment	Did not help (0)		Helped slightly (1)		Helped noticeably (2)		Helped significantly (3)		*All	Average
	n	%	n	%	n	%	n	%	n	\bar{x}
TENS currents	11	13,4%	23	28,1%	33	40,2%	15	18,3%	82	1,63
DD currents	16	30,8%	17	32,7%	18	34,6%	1	1,9%	52	1,13
Ultrasound	10	17,5%	26	45,6%	17	29,8%	4	7,0%	57	1,24
Iontophoresis	6	9,5%	20	31,8%	27	42,9%	10	15,9%	63	1,60
Cryotherapy	3	5,0%	10	16,7%	20	33,3%	27	45,0%	60	2,00
Magnetic field	14	25,5%	20	36,4%	14	25,5%	7	12,7%	55	1,67
Spine and abdomen muscle exercises	3	3,1%	7	7,1%	31	31,6%	57	58,2%	98	2,27
McKenzi method exercises	3	5,2%	6	10,3%	17	29,3%	32	55,2%	58	1,80
Kinesiotaping	3	5,4%	17	30,4%	23	41,1%	13	23,2%	56	1,73
Manual therapy	2	2,7%	3	4,1%	22	29,7%	47	63,5%	74	2,54

Therapeutic massage	2	2,2%	12	12,9%	28	30,1%	51	54,8%	93	2,38
Other	0	0,0%	2	12,5%	6	37,5%	8	50,0%	16	2,37

The respondents were also asked to mark on 1 to 10 VAS scale the level of pain intensity they experienced before, as well as after the implemented physiotherapeutic procedures. The intensity of pain before the rehabilitation was estimated at an average level of $\bar{x} = 7,21$ pts $\pm 1,54$ pts, while after the rehabilitation it was $\bar{x} = 3,44$ pts $\pm 1,97$ pts. The analysis of indicated level of pain ailments on the VAS scale before and after physiotherapeutic treatment showed a significant reduction of subjectively felt pain ailments in the group of respondents after the physiotherapeutic treatment ($p < 0,001$) by on average 3,77 pts (about 52% of initial value).

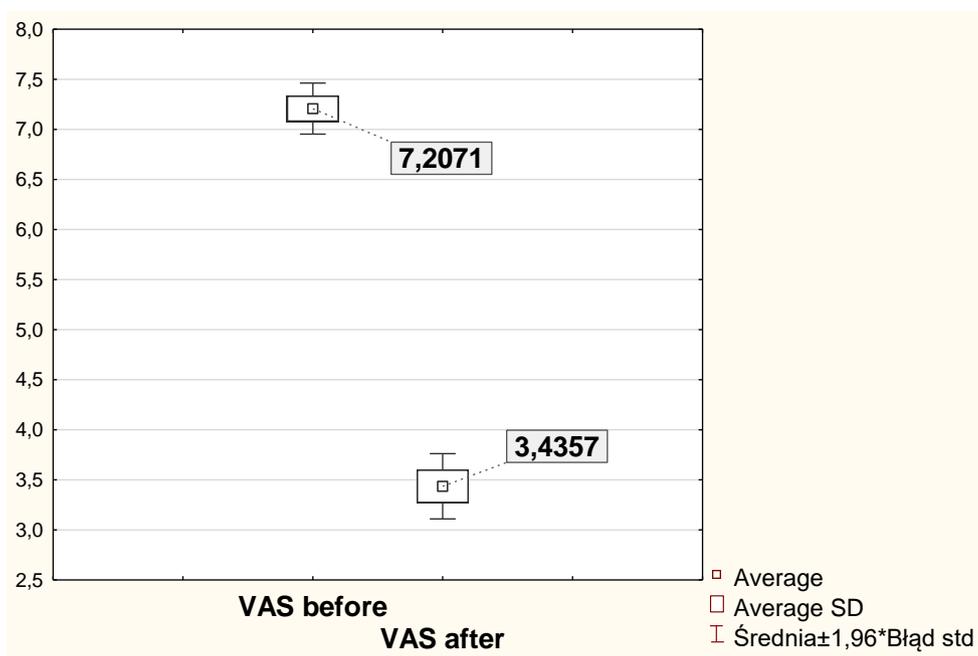


Figure 1. Average level of pain intensity marked on VAS scale before and after implementation of physiotherapeutic treatment.

The respondents also evaluated life quality on a 5-level scale (1 – bad; 3 – moderate; 5 – very good). Before rehabilitation process they estimated their life quality on average at $\bar{x} = 1,96$ pts $\pm 1,2$ pts; after the rehabilitation the average number of points rose to $\bar{x} = 3,78$ pts $\pm 1,08$ pts. The increased quality of life by 1,82 pts in a 5-level scale in two following measurements, confirmed the significant difference between the average quality of life of respondents before and after rehabilitation.

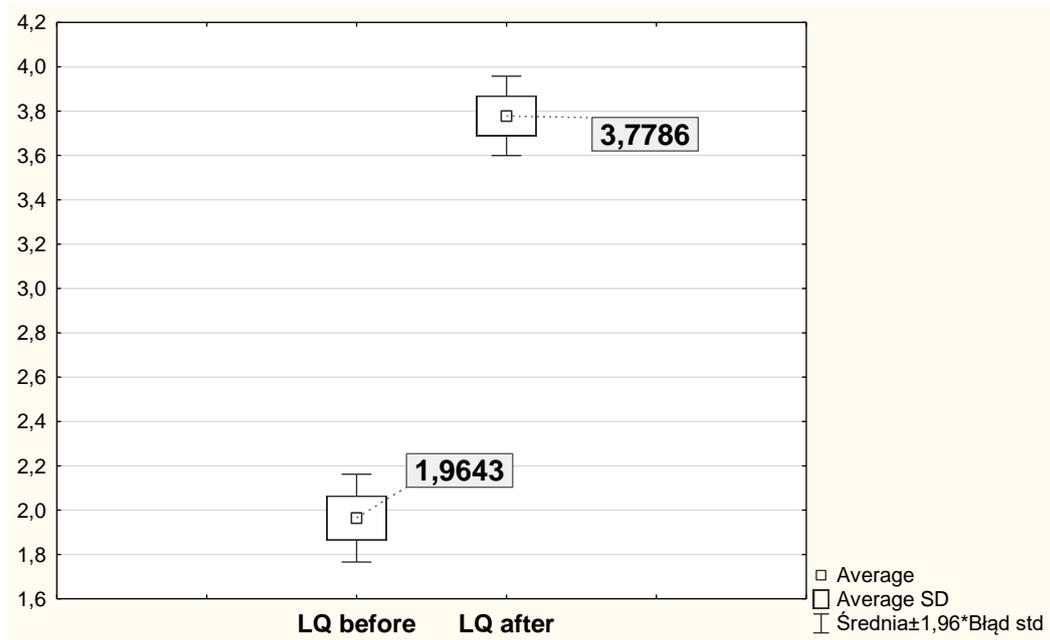


Figure 2. Average level of subjective assessment of life quality (LQ) before and after implemented physiotherapeutic treatment.

The applied rehabilitation process improved the life quality of majority of respondents to a significant (N = 59; 42,1%) or medium (N = 44; 31,4%) extent (Table 3).

Table 3. The extent of increased life quality among the respondents after the applied physiotherapeutic treatment

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The extent of increased life quality among the respondents after the applied physiotherapeutic treatment	n	%
Significant improvement of life quality	59	42,1%
Medium improvement of life quality	44	31,4%
Slight improvement of life quality	24	17,1%
No improvement of life quality	13	9,3%
All	140	100,0%

4. DISCUSSION

Chronic pain of the lower spine is a common ailment and rehabilitation of patients with L-S discopathy is a long and complicated process. Above all a combination of rehabilitation methods like physical therapy, kinesiotherapy, manual therapy and therapeutic massage brings best results. The combination of these methods is more effective, which was confirmed by numerous studies. However, data from the literature often confirm the effectiveness of the therapy in the case of acute lower back pain [24-26], while few provide satisfactory evidence of good prognosis in the case of chronic pain [27].

The rehabilitation program for every patient should always be adjusted and realized individually. During the therapy some physio-therapeutic methods are combined in order to achieve better results.

In the researched group, in the author's research, the duration of pain ailments was diverse. The most frequently patients experienced pain for more than 2 years – 47 respondents chose this answer. Studies conducted in the group of patients with spine pain in the literature include age groups from early adolescence to geriatric age. In contrast, the incidence of pain usually varies from one to several or more than a dozen pain episodes lasting more than 3 months [28].

In a study conducted by the author 80% of the respondents indicated the movement of bending as the most painful. Unfortunately, when pain arises - a dysfunction is created that prevents the performance of activities that are not yet a problem. Therefore, physical activity is important for maintaining health. Rehabilitation or preventive activities based on physical activity have significant therapeutic efficacy in restoring full functionality, as confirmed by many studies.[29,30] A randomized controlled trial confirmed the significant effectiveness of pitalas exercise in a group of people with nonspecific lower back pain. It was also confirmed that this method does not have a detrimental effect on the participants [31]. In addition, literature reports also confirm the essence of the effectiveness of home rehabilitation using the regularity and reliability of conducting therapeutic activities by the patient [32].

The combined methods of treatment definitely bring the best results in eliminating or reducing painful ailments of the lower part of spine. According to own elaboration, such treatment as spine and abdomen muscle exercises, manual therapy and therapeutic massage became the most effective. Less effective were diadynamic currents and ultrasound. The therapy also used other treatment: DD currents, iontophoresis, cryotherapy, kinesiotaping and blockage, infrared lamp, exercises in water, pearl and brine bath, laser, aquavibron and Tarbert currents. However, in the studies available in the literature, there is evidence of a significant reduction in back pain averaging 3.5 points on the VAS scale due to the use of a 12 week vibration therapy program with the three sessions per week were conducted. A low frequency 16-160 Hz sound wave was used. Patients after the therapy indicated a significant reduction in the level of pain experienced and the degree of disability associated with pain [33].

In the available literature it is possible to find similar results. Most often patients used TENS transcutaneous stimulation, iontophoresis with non-steroid anti-inflammatory medicine, as well as kinesiotherapy. A comparison was also made between isokinetic exercises and normal exercises performed by patients. After applying both forms of kinesiotherapy, a significant reduction of pain assessed with the VAS scale was noted. However, there were no statistically significant differences between the two forms of therapy

($p > 0.05$). Both forms of exercise are effective and bring the desired therapeutic effects in the field of rehabilitation [34].

Available literature confirms the effectiveness of using therapeutic massage in various forms to reduce pain in patients with spinal pain. In the group of patients who underwent deep-tissue massage during the 2-week treatment, a decrease in the level of pain assessed on the VAS scale was noted [35].

Good effects were also accomplished by kinesiotaping. In own research 56 patients used this method, and 23,2% reported that it helped to eliminate pain to a large extent. According to other studies, kinesiotaping helped to reduce pain ailments for 31 patients (62%) out of 50 [36].

The subject literature also reports on the effectiveness of megnetotherapy in a group of patients with low back pain. In the authors' research, the patients indicated the average value of the points assessing the quality of the therapy applied, equal to $\bar{x} = 1.67$ to the maximum value of 3. This measurement was a measurement of the subjective feelings of the patient. In the studies, using simulated therapy conditions and a single blind trial to increase the reliability of the study, high analgesic effect of magnetic therapy with magnetic induction values of 10 mT, 50 Hz frequency and a single treatment duration of 20 min was confirmed. The improvement was noted in the area of mobility and functionality of patients with spinal pain during 3 – week treatment. The pain level was assessed using the VAS scale. In the examined group, the subjective level of perceived pain decreased from an average value of 5.80 to 2.15 ($p = 0,0015$) [37]. Analyzing the level of perceived pain, in the group of subjects at the onset of the phase of acute spinal pain 51% ($N = 195$) declared severe pain, and 12% - very strong ($N = 45$). After entering the chronic phase, 33% declared mild pain and 28% very mild. In this group, no rehabilitation was used, but acute pain in the acute phase was confirmed [27]. In contrast, in the author's studies, each patient had a chronic phase of lower back pain, in some of the pain symptoms appear even from around two years. Before and after the rehabilitation in chronic pain there was a decrease in the level of pain perceived among the total number of subjects with = 7.21 points \pm 1.54 points. on = 3.44 points \pm 1.97 after completed rehabilitation.

Moreover, the life quality of patients was also analysed and it also changed due to the implemented therapy. The author in his own research confirmed the increase in the perceived quality of life after rehabilitation from 1.96 to 3.78 on a scale of 1 - 5. The author of an own study confirms the increase of the perception level of life quality after the rehabilitation. In the analyzed studies, the quality of life of patients with chronic lower back pain was assessed using two questions borrowed from a standardized tool for assessment quality of life SF - 36 and modified in terms of lower back pain. Health self-esteem was carried out just before the beginning of a chronic period of pain in the spine. On average, approximately 99.8 days (SD 10.58) from the onset of acute cruciate pain. Out of 406 respondents, 156 (39%) indicated good health, while 35% ($N = 141$) had a very good health perception. [27]

5. CONCLUSIONS

- Outpatient physiotherapy reduced pain ailments in patients suffering from lumbosacral spine discopathy. The patients indicated lower level of pain perception in VAS scale as a result of rehabilitation.

- A combination of TENS currents, spine and abdomen muscle exercises, therapeutical massage and manual therapy does not eliminate pain ailments of the lumbar-sacral spine completely, but it causes their significant reduction.
- Physiotherapy applied for patients with lumbar-sacral spine discopathy significantly improved life quality of the respondents.

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