The impact of rehabilitation on pain complaints and functional efficiency of low back pain syndrome patients that resided at the CRR KRUS Center in Iwonicz Zdrój

Damian Wiernasz[1,2], Justyna Leszczak[1]

[1] Medical College, Institute of Health Science, University of Rzeszow, Poland

[2] Department of Rehabilitation, KRUS Farmers Rehabilitation Center in Iwonicz Zdrój, Poland

Correspondence to: Damian Wiernasz, email: damianwiernasz@yahoo.com

DOI: https://doi.org/10.5114/phr.2023.128862

Received: 04.01.2023 **Reviewed:** 14.01.2023 **Accepted:** 15.01.2023

Abstract

Background: Spinal pain is one of the most common conditions affecting young and middle-aged people and negatively affecting their quality of life. There are missing data about the risk of lumbosacral spine pain in Polish farmers and the lack of up-to-date research, as well as the impact of rehabilitation holidays on lumbosacral spine pain and the level of functional performance.

Aims: The study aimed to evaluate the pain complaints and functional performance of patients with lumbosacral spinal pain syndrome before and after a three-week rehabilitation program. The effects of gender, body mass index (BMI), and Visual Analogue Scale (VAS) on the incidence of pain and the results of functional tests in the subjects were also compared.

Material and methods: The study involved 90 patients undergoing sanatorium treatment who reported low back pain. All subjects were examined twice with three functional tests, and the pain level was assessed using the VAS scale (Measure 1 – before physiotherapy and Measure 2 – 3 weeks after physiotherapy).

Results: After three weeks of physical therapy, there was a decrease in the average level of perceived pain from 5 (± 1.15) to 4 (± 1.69) in the VAS scale and a slight decrease from 1.16 (± 0.20) to 1.14 (± 0.22) of the mean lower limb symmetry index (SI) in Two Scale Test (TST). The average time needed to perform the Timed Up and Go (TUG) was reduced by 0.82 seconds, and the average distance in the Fingertip-to-Floor (FTF) test was reduced by 6.48 cm.

Conclusions: The data collected confirms that the three-week rehabilitation camp impacted reducing the level of pain and increasing the level of functional performance. It was also shown that BMI and pain level affected the functional performance tests.

Key words

VAS scale, low back pain, SPA rehabilitation, Timed Up and Go test, Two Scale Test, Symmetry Index, Thomayer test.

Introduction

Spinal pain is one of the most common conditions that affect both young and middle-aged people and has a negative impact on their quality of life [1]. They are most often caused by pathological conditions located in the lumbosacral (80%) and cervical (18%) segments of the spine, while they are least common in the thoracic segment (2%) [2].

Factors predisposing to the aforementioned ailments can be extremely varied, ranging from degenerative changes, sedentary lifestyles, and low physical activity to trauma [3].

The etiology of spinal pain syndromes is determined by a number of factors that can interact with each other. Abnormalities of muscles, fascia, ligaments, bony structures, intervertebral joints, or intervertebral discs will adversely affect peripheral nerves and the spinal cord. Sometimes it happens that pain complaints do not have a specific cause, and their source should be sought in a different place [4].

Due to their pathomechanism, pain syndromes of the lumbosacral spine can have various symptoms. They are most often accompanied by pain occurring in the lumbosacral spine region, sometimes also with radiation to the lower extremities. They can be caused by disorders within the anatomical structures of the spine and the surrounding soft tissues, or occur based on pain projected from other body organs [5-6]. The consequences of these disorders can include decreased mobility in the lumbar spine and tonic disorders of the surrounding muscles [7].

Pain complaints are an important determinant of the level of functional performance, which will cause a reduction in its level through deterioration of the psychological condition, as well as the creation of a barrier that will prevent the independent performance of daily activities and may lead to dependence on the assistance of others, and, consequently, will contribute to social isolation or deterioration of quality of life [8].

A literature review reveals few scientific reports devoted to the study of lumbosacral back pain among Polish farmers. Wróblewska et al. [9] report that out of one hundred patients surveyed at the Farmers' Rehabilitation Center in Szklarska Poreba, 68% of all subjects reported complaints of lumbosacral spine pain. According to Solecki [10], these ailments are reported by 94% of all surveyed farmers in the selected seven municipalities of Lublin Province, while only 63% of those surveyed in the control group of white-collar workers. Data made available by Eurostat and the National Institute of Hygiene as part of the National General Hospital Morbidity Survey confirm that farm workers are the group most at risk of hospitalization for sacral pain in Poland, where the risk is 5.17 (95% Cl: 1.57-17.0), in comparison, the risk in heavy equipment operators is 2.39 (95% Cl: 1.09-5.25) [11].

The available literature lacks studies of functional fitness using functional tests among Polish farmers. Only Ignasiak et al. [12] in their 2012 publication, analyzed the effect of a rehabilitation camp on functional fitness using goniometric testing of spinal mobility and selected joints.

Analyzing scientific reports, one cannot help but notice the increased risk of lumbosacral spine pain in Polish farmers and the lack of current research, as well as the impact of rehabilitation holidays on lumbosacral pain and the level of functional performance. The complexity, extent, and frequent ignoring of the first symptoms indicating the onset of lumbosacral spine conditions raises the need to develop and expand this issue. In addition, it is worth noting the fact of the scanty amount of available research on lumbosacral pain in a group of Polish farmers.

Aims

This study aimed to evaluate the pain complaints and functional performance of patients with lumbosacral pain syndrome before and after a three-week rehabilitation program. The effects of gender, body mass index (BMI), and Visual Analogue Scale (VAS) on the incidence of pain and the results of functional tests in the subjects were also compared.

Material and methods

Study Participants

The study included 90 patients undergoing sanatorium treatment at the KRUS Farmers' Rehabilitation Center (pol. Centrum Rehabilitacji Rolników) in Iwonicz Zdrój, who reported complaints of pain in the lumbosacral spine at a level of at least 4 on the VAS scale. The study group included 66 women and 24 men in the age range of 35-70 years. BMI in 22 people in the study group was at the level of normal weight, in 35 it indicated overweight and in 33 people obesity. The subjects had pain complaints lasting from 2 to 35 years; the average number of years of complaints was 14 ± 8 years (**Table 1**).

Rehabilitation Program

All patients participated in a three-week rehabilitation program (Monday through Saturday). The daily duration of rehabilitation treatments was about two hours and consisted of five treatments ordered by the physician. The rehabilitation program included kinesiotherapy, physical therapy, hydrotherapy, and thermotherapy procedures.

Measurement Tools

The study used a proprietary questionnaire, based on which the study group was selected. Qualified patients were examined twice with three functional tests and the evaluation of the pain level using the VAS scale, according to the following scheme: Measure 1 – on the day of admission to the Sanatorium and Measure 2 – on the day of discharge from the Sanatorium.

The following functional tests were used to evaluate the effects of physiotherapy:

- Two Scale Test (TST) tests the symmetry of body weight distribution between the right and left lower extremities [13]. The lower limb symmetry index (SI) was also used. It is calculated by dividing the value of the more heavily loaded limb by the weight of the other lighter limb. A range of 1÷1.15 was used as the standard for the CI [14].
- Fingertip-to-Floor (FTF) (Thomayer's test) - which assesses spinal mobility when leaning forward [15].
- Timed Up and Go (TUG) assesses functional performance and fall risk [16].

Table 1. Characteristics of the study group.

Variable	$\bar{X}$	Me	Min	Max	Q_1	Q_3	SD
Age [years]	53.26	54	35	70	50	58	6.74
BMI [kg/m^2]	28.43	28.31	19.07	39.89	24.97	31.60	4.48
Length of pain [years]	13.56	12.50	2	35	6	19	8.25

Abbreviations: *$\bar{X}$, mean; Me, median; Min, minimum; Max, maximum; Q_1, lower quartile; Q_3, upper quartile; SD, standard deviation; BMI, body mass index.*

Statistical Analysis

Statistical analysis was performed using Statistica 13.3 (Copyright 1984 - 2022 TIBCO Software Inc.) and Microsoft Excel. For variables expressed on qualitative scales, results were presented in the form of frequency distributions with percentages. The Wilcoxon, Student's t, and Mann-Whitney U tests were used to analyze the relationship of unmeasured characteristics. A level of significance was assumed $\alpha = 0.05$. A result was considered statistically significant when the calculated test probability adopted $p < 0.05$.

Results

The study indicates that the three-week rehabilitation program significantly reduced pain (Wilcoxon test $p = 0.0000$; $\alpha = 0.05$). The subjects' average pain level decreased from 5 ± 1.15 to 4 ± 1.69 on the VAS scale (**Table 2**). It was also reported that the vast majority of subjects (78.89% - 71 people) reported a reduction in pain after the three-week rehabilitation program. In 15.56% (14 people), the pain remained at the same level, while in 5.56% (5 people) the pain intensified (**Figure 1**).

The statistical results of the Wilcoxon test for all three functional performance tests indicate that the three-week turnout significantly improves functional performance. The mean level of the subjects' SI index before the turnout was above the acceptable norm and was 1.16 ± 0.20, while after the three-week physiotherapy, it decreased and was at the level of the norm and was 1.14 ± 0.22 (**Table 2**).

The average time required to complete the TUG test decreased by 0.82 seconds, while the percentage of those with a time of 10-19 seconds, indicating an average risk of falling and an average level of locomotion, did not decrease (**Table 2**).

Patients in the FTF test achieved a lower average distance of 6.48 cm from the toes to the floor, while the highest score decreased by 3 cm. It is also worth mentioning here that two of the subjects, after receiving three weeks of physiotherapy, were unable to perform the FTF test (**Table 2**).

Table 2. The pain level in the VAS scale and the results of functional tests of the subjects.

Variable	n	$\bar{X}$	Me	Min	Max	Q_1	Q_3	SD	P-value
VAS Measure 1	90	5.18	5	4	9	4	6	1.15	**0.0000**
VAS Measure 2	90	3.61	4	1	9	2	4	1.69	
TST SI Measure 1	90	1.16	1.12	1	2.55	1.05	1.19	0.20	**0.0494**
TST SI Measure 2	89	1.14	1.09	1	2.55	1.06	1.14	0.22	
TUG Measure 1	90	6.84	7	5	14	6	7	1.40	**0.0000**
TUG Measure 2	90	6.02	6	4	12	5	6	1.40	
FTF Measure 1	90	22.38	21	0	55	8.0	36	15.47	**0.0000**
FTF Measure 2	88	15.9	13.5	0	52	2.5	26	14.13	

Abbreviations: *$\bar{X}$, mean; Me, median; Min, minimum; Max, maximum; Q_1, lower quartile; Q_3, upper quartile; SD, standard deviation; VAS, Visual Analogue Scale; TST, Two Scale Test, SI, lower limb symmetry index; TUG, Timed Up and Go test; FTF, Fingertip-to-Floor test; p, level of statistical significance; n, number of participants.*

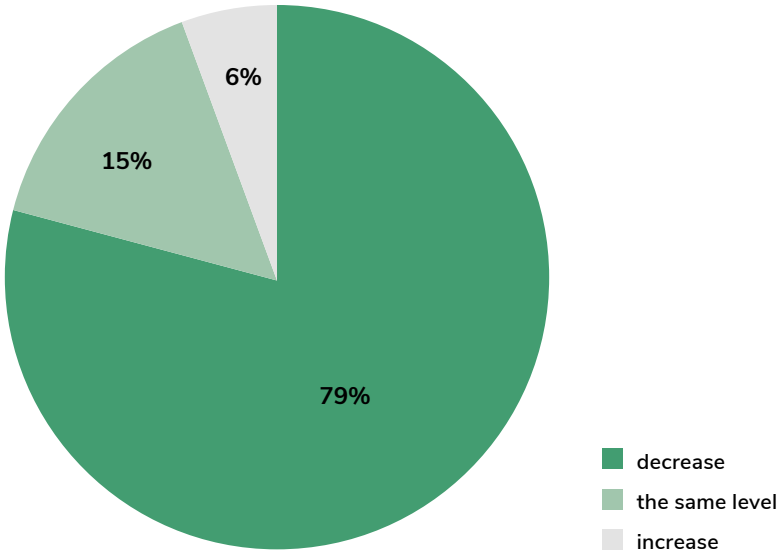

Figure 1. Percentage distribution of change in pain after 3 weeks of rehabilitation.

The results of the Mann-Whitney U test (Measure 1. p = 0.2776 and Measure 2. p = 0.7843) indicate that gender has no significant effect on pain levels. Both female and male subjects in Measure 1 rated the average pain level at 5 on the VAS scale, while in Measure 2 they also rated at the same level, and it was 4 on the VAS scale (**Table 3**).

The results of the Mann-Whitney U test (Measure 1. p = 0.2776 and Measure 2. p = 0.0464) indicate that in Measure 1, gender has no significant effect on SI in the TST test, while in Measure 2, gender had a slight effect on the above index. In Measure 1, the mean SI level in the female subjects was at 1.15 ± 0.21, and this was at the upper limit of normal. In contrast, the SI in men was outside the norm at 1.18 ± 0.15. In Measure 2, both men and women had a mean SI index level of 1.14, which was within the upper limit of the norm (**Table 3**).

The results of the Mann-Whitney U test (Measure 1. p = 0.4599 and Measure 2. p = 0.3267) indicate that gender has no significant effect on TUG test performance. Both female and male respondents in both measurements recorded similar results of the average, highest and lowest time required to complete the test. The average time for both genders did not exceed 9 seconds, indicating a low risk of falling and a good level of locomotion (**Table 3**).

The results of the Mann-Whitney U test (Measure 1. p = 0.1034 and Measure 2. p = 0.0287) indicate that in Measure 1, gender has no significant effect on FTF test performance, while in Measure 2, gender has a significant effect on the distance of the fingers to the floor. In Measure 1, the mean distance to the floor for female subjects is 20.83 ± 15.87 cm and 26.63 ± 13.74 cm for male subjects. In Measure 2, the mean distance of the toes to the floor for women is 14.45 ± 14.92 cm and 19.75 ± 11.11 cm for men (**Table 3**).

The results of the Student's t-test (Measure 1. p = 0.000 and Measure 2. p = 0.0000) indicate that BMI has a statistically significant effect on pain levels. With both measurements, the lowest average pain level occurred in the obese group and the overweight individuals. In contrast, the highest scores for both measurements were in those with normal body weight (**Table 4**).

The results of the Student's t-test (Measure 1. p = 0.000 and Measure 2. p = 0.0000) indicate that BMI has a statistically significant effect on the level of the Ws index. With both measurements, the lowest mean value of the SI index was recorded for those with normal body weight as well as those with obesity. In contrast, the highest mean value of the SI index for both measurements was

Table 3. Comparison of subjects' gender with VAS scale and functional performance tests.

Variable	Sex	n	$\bar{X}$	Me	Min	Max	Q_1	Q_3	SD	P-value
VAS Measure 1	Male	24	4.96	5	4	7	4	6	1.08	0.2776
VAS Measure 1	Female	66	5.26	5	4	9	4	6	1.17	
VAS Measure 2	Male	24	3.63	3.50	1	6	2	5	1.53	0.7843
VAS Measure 2	Female	66	3.61	4	1	9	2	4	1.75	
TST SI Measure 1	Male	24	1.18	1.17	1.02	1.72	1.06	1.24	0.15	0.1533
TST SI Measure 1	Female	66	1.15	1.11	1	2.55	1.05	1.19	0.21	
TST SI Measure 2	Male	23	1.14	1.12	1.02	1.35	1.06	1.17	0.09	**0.0464**
TST SI Measure 2	Female	66	1.14	1.07	1	2.55	1.05	1.13	0.25	
TUG Measure 1	Male	24	6.75	6	5	10	5.50	8	1.59	0.4599
TUG Measure 1	Female	66	6.88	7	5	14	6	7	1.33	
TUG Measure 2	Male	24	6.00	5	5	12	5	6.50	1.67	0.3267
TUG Measure 2	Female	66	6.03	6	4	12	5	6	1.30	
FTF Measure 1	Male	24	26.63	30	0	52	17	38	13.74	0.1034
FTF Measure 1	Female	66	20.83	19	0	55	6	31	15.87	
FTF Measure 2	Male	24	19.75	21	0	38	11.50	27	11.11	**0.0287**
FTF Measure 2	Female	64	14.45	11.50	0	52	0	21	14.92	

Abbreviations: *$\bar{X}$, mean; Me, median; Min, minimum; Max, maximum; Q_1, lower quartile; Q_3, upper quartile; SD, standard deviation; VAS, Visual Analogue Scale; TST, Two Scale Test, SI, lower limb symmetry index; TUG, Timed Up and Go test; FTF, Finger-tip-to-Floor test; p, level of statistical significance; n, number of participants.*

for overweight subjects (1.19 ± 0.29 Measure 1. and 1.20 ± 0.33 Measure 2.) (**Table 4**).

The results of the Student's t-test (Measure 1. p = 0.000 and Measure 2. p = 0.0000) indicate that BMI has a statistically significant effect on the outcome of the TUG test. In Measure 1, the lowest mean value of time required to complete the test was found in normal-weight subjects (6.55 ± 1.37 seconds), followed by overweight (6.69 ± 1.60 seconds) and obese subjects (7,21 ± 1,11 s). In Measure 2, overweight (5.97 ± 1.50s) and obese (5.97 ± 1.05s) subjects had the lowest mean value of time. In contrast, the highest mean value was had by those with normal body weight (6.18 ± 1.71 s) (**Table 4**).

The results of the Student's t-test (Measure 1. p = 0.000 and Measure 2. p = 0.0000) indicate that BMI has a statistically significant effect on the result of the FTF test. In both measurements, the lowest mean distance to the floor was recorded for obese subjects, 21 ± 16.11 cm for Measure 1. and 14.03 ± 13.84 cm for Measure 2. In measurement one, a similar mean distance value was recorded for normal-weight (23.09 ± 14.33 cm) and overweight (23.33 ± 15.90 cm) subjects, respectively. In

Measure 2, a lower mean distance value was obtained by overweight subjects (15.70 ± 13.27 cm). For normal-weight subjects, the average distance of the toes to the floor was significantly higher (19 ± 15.84 cm) (**Table 4**).

Table 4. Comparison of subjects' BMI with VAS scale and functional performance tests.

Variable	BMI	n	$\bar{X}$	Me	Min	Max	Q_1	Q_3	SD	P-value
VAS Measure 1	Norm	22	5.50	5.50	4	8	4	6	1.34	
VAS Measure 1	Overweight	35	5.09	5	4	9	4	6	1.17	**0.0000**
VAS Measure 1	Obesity	33	5.06	5	4	7	4	6	0.97	
VAS Measure 2	Norm	22	4.36	4	2	8	3	6	1.71	
VAS Measure 2	Overweight	35	3.74	4	2	9	2	4	1.65	**0.0000**
VAS Measure 2	Obesity	33	2.97	2	1	6	2	4	1.51	
TST SI Measure 1	Norm	22	1.13	1.13	1	1.31	1.08	1.17	0.07	
TST SI Measure 1	Overweight	35	1.19	1.09	1.02	2.55	1.05	1.19	0.29	**0.0000**
TST SI Measure 1	Obesity	33	1.15	1.13	1	1.38	1.04	1.23	0.12	
TST SI Measure 2	Norm	22	1.08	1.07	1	1.25	1.06	1.11	0.06	
TST SI Measure 2	Overweight	34	1.20	1.10	1	2.55	1.06	1.16	0.33	**0.0000**
TST SI Measure 2	Obesity	33	1.12	1.09	1	1.59	1.05	1.14	0.12	
TUG Measure 1	Norm	22	6.55	6	5	10	6	7	1.37	
TUG Measure 1	Overweight	35	6.69	6	5	14	6	7	1.60	**0.0000**
TUG Measure 1	Obesity	33	7.21	7	5	10	6	8	1.11	
TUG Measure 2	Norm	22	6.18	6	4	12	5	6	1.71	
TUG Measure 2	Overweight	35	5.97	6	5	12	5	6	1.50	**0.0000**
TUG Measure 2	Obesity	33	5.97	6	5	8	5	6	1.05	
FTF Measure 1	Norm	22	23.09	20	0	51	15	32	14.33	
FTF Measure 1	Overweight	35	23.23	23	0	55	7	38	15.90	**0.0000**
FTF Measure 1	Obesity	33	21	21	0	53	6	36	16.11	
FTF Measure 2	Norm	22	19	17	0	52	7	30	15.84	
FTF Measure 2	Overweight	33	15.70	14	0	49	3	22	13.27	**0.0000**
FTF Measure 2	Obesity	33	14.03	10	0	43	0	26	13.84	

Abbreviations: *$\bar{X}$, mean; Me, median; Min, minimum; Max, maximum; Q_1, lower quartile; Q_3, upper quartile;* SD, *standard deviation;* VAS, *Visual Analogue Scale;* TST, *Two Scale Test,* SI, *lower limb symmetry index;* TUG, *Timed Up and Go test;* FTF, *Finger-tip-to-Floor test; p, level of statistical significance; n, number of participants.*

The results of the Wilcoxon test (Measure 1. p = 0.000 and Measure 2. p = 0.0000), at the accepted level of significance (α = 0.05), indicate that the level of pain has a statistically significant effect on the SI index and the performance of the TUG and FTF tests (**Tables 5-7**).

The lowest mean SI index value in Measure 1 was obtained by those in the group with pain at level 9 on the VAS scale and was 1.05. In contrast, in Measure 2, the lowest mean SI index value (1.08) was in the group with pain at level 4. The highest mean SI index value in Measure 1 was in the group with pain at level 8 on the VAS scale, and amounted to 1.55 ± 0.86. In Measure 2, the highest mean SI index value (1.53) was in the group with pain at level 9 on the VAS scale, and this value is well above the acceptable norm for the SI index (**Table 5**).

Table 5. Comparison of the VAS scale with the SI index in the test of two scales.

Variable	VAS	n	$\bar{X}$	Me	Min	Max	Q_1	Q_3	SD	P-value
TST SI Measure 1	4	30	1.15	1.13	1.02	1.66	1.05	1.23	0.13	
TST SI Measure 1	5	30	1.12	1.09	1	1.41	1.03	1.16	0.12	
TST SI Measure 1	6	19	1.17	1.17	1	1.72	1.07	1.19	0.16	
TST SI Measure 1	7	7	1.18	1.17	1.05	1.37	1.12	1.22	0.10	**0.000**
TST SI Measure 1	8	3	1.55	1.07	1.03	2.55	1.03	2.55	0.86	
TST SI Measure 1	9	1	1.05	1.05	1.05	1.05	1.05	1.05		
TST SI Measure 2	1	5	1.11	1.13	1.05	1.17	1.05	1.13	0.05	
TST SI Measure 2	2	25	1.11	1.08	1.02	1.35	1.06	1.15	0.09	
TST SI Measure 2	3	11	1.21	1.08	1	2.33	1.03	1.16	0.38	
TST SI Measure 2	4	29	1.08	1.08	1	1.25	1.05	1.11	0.06	
TST SI Measure 2	5	8	1.10	1.06	1.03	1.25	1.04	1.16	0.08	**0.0000**
TST SI Measure 2	6	6	1.23	1.12	1.07	1.59	1.11	1.35	0.21	
TST SI Measure 2	7	2	1.12	1.12	1.07	1.18	1.07	1.18	0.08	
TST SI Measure 2	8	2	1.79	1.79	1.04	2.55	1.04	2.55	1.07	
TST SI Measure 2	9	1	1.53	1.53	1.53	1.53	1.53	1.53		

Abbreviations: *$\bar{X}$, mean; Me, median; Min, minimum; Max, maximum; Q_1, lower quartile; Q_3, upper quartile;* SD, *standard deviation;* VAS, *Visual Analogue Scale;* TST, *Two Scale Test,* SI, *lower limb symmetry index;* TUG, *Timed Up and Go test;* FTF, *Finger-tip-to-Floor test; p, level of statistical significance; n, number of participants.*

The lowest average amount of time (6.53 ± 1.11 seconds) required to complete the test in Measure 1, was obtained by the group with pain level 4 on the VAS scale. In contrast in Measure 2, the lowest average amount of time (5 ± 0 s) needed to complete the test was obtained by the group with pain at level 1 on the VAS scale. In contrast, the highest average amount of time (14 s) needed to perform the test in Measure 1 was obtained by the group of subjects with pain at level 9 on the VAS scale. In Measure 2, the group with pain at level 9 on the VAS scale had the lowest average amount of time (12 s) needed to complete the test (**Table 6**).

The smallest mean finger-to-floor distance in Measure 1 was in the group with pain at level 4 on the VAS scale, and this value was 17.20 ± 14.223 cm. The lowest mean toe-to-floor distance in Measure 2 was at 4.20 ± 5.76 cm and was obtained by subjects with pain at VAS level 1. On the other hand, the highest mean distance to the floor in Measure 1 was had by the group with pain level 8 on the VAS scale, and this value was 38.33 ± 18.77 cm. In Measure 2, the largest mean distance of the fingers to the floor was 36 cm and was obtained by those with a pain level of 8 on the VAS scale (**Table 7**).

Table 6. Comparison of the VAS scale with the TUG test.

Variable	VAS	n	$\bar{X}$	Me	Min	Max	Q_1	Q_3	SD	P-value
TUG Measure 1	4	30	6.53	6.50	5	10	6	7	1.11	
TUG Measure 1	5	30	6.83	7	5	10	6	8	1.34	
TUG Measure 1	6	19	7	7	5	9	6	8	1	
TUG Measure 1	7	7	6.71	6	6	8	6	8	0.95	**0.0000**
TUG Measure 1	8	3	7	7	5	9	5	9	2	
TUG Measure 1	9	1	14	14	14	14	14	14		
TUG Measure 2	1	5	5	5	5	5	5	5	0	
TUG Measure 2	2	25	5.44	5	4	7	5	6	0.65	
TUG Measure 2	3	11	6	6	5	8	5	7	1	
TUG Measure 2	4	29	5.90	6	5	8	5	6	0.90	
TUG Measure 2	5	8	6.63	6	5	12	5.50	6.50	2.26	**0.0000**
TUG Measure 2	6	7	6.86	8	5	8	5	8	1.46	
TUG Measure 2	7	2	7.50	7.50	6	9	6	9	2.12	
TUG Measure 2	8	2	8	8	6	10	6	10	2.83	
TUG Measure 2	9	1	12	12	12	12	12	12		

Abbreviations: *$\bar{X}$, mean; Me, median; Min, minimum; Max, maximum; Q_1, lower quartile; Q_3, upper quartile; SD, standard deviation; VAS, Visual Analogue Scale; TST, Two Scale Test, SI, lower limb symmetry index; TUG, Timed Up and Go test; FTF, Fingertip-to-Floor test; p, level of statistical significance; n, number of participants.*

Table 7. Comparison of the VAS scale with the FTF test.

Variable	VAS	n	$\bar{X}$	Me	Min	Max	Q_1	Q_3	SD	P-value
FTF Measure 1	4	30	17.20	16.50	0	42	1	30	14.23	0.0000
FTF Measure 1	5	30	21.17	21.50	0	51	6	30	14.86	
FTF Measure 1	6	19	27.68	31	0	53	16	40	15.56	
FTF Measure 1	7	7	27.57	31	5	52	15	38	16.28	
FTF Measure 1	8	3	38.33	42	18	55	18	55	18.77	
FTF Measure 1	9	1	29	29	29	29	29	29		
FTF Measure 2	1	5	4.20	0	0	11	0	10	5.76	0.0000
FTF Measure 2	2	25	9.92	11	0	31	0	15	10.12	
FTF Measure 2	3	11	12.45	10	0	41	1	20	12.04	
FTF Measure 2	4	29	15.72	13	0	50	5	22	13.77	
FTF Measure 2	5	8	27	33.50	3	43	13	38.50	15.08	
FTF Measure 2	6	7	30.71	30	18	42	23	38	8.92	
FTF Measure 2	7	2	35	35	18	52	18	52	24.04	
FTF Measure 2	8	1	36	36	36	36	36	36	36	
FTF Measure 2	9	0								

Abbreviations: *$\bar{X}$, mean; Me, median; Min, minimum; Max, maximum; Q_1, lower quartile; Q_3, upper quartile; SD, standard deviation; VAS, Visual Analogue Scale; TST, Two Scale Test, SI, lower limb symmetry index; TUG, Timed Up and Go test; FTF, Fingertip-to-Floor test; p, level of statistical significance; n, number of participants.*

Discussion

Lower back pain syndromes are a significant problem that adversely affects the quality of life of people of all ages, resulting in a significant deterioration of life. Between 50-85% of the population in developed countries experience back pain, while nearly 85% of Polish adults suffer from lower back pain [3,17]. Low back pain is characterized by discomfort below the twelfth rib and sometimes radiating to the lower extremities [5].

The etiology of the above pain syndromes is determined by a number of factors that can interact with each other. Abnormalities of muscles, fascia, ligaments, bony structures, intervertebral joints, or intervertebral discs will adversely affect peripheral nerves and the spinal cord. Sometimes it happens that pain complaints do not have a specific cause, and their source should be sought in a separate place – non-specific pain [4].

Due to the extent and prevalence of lumbosacral spine disorders, the ability to diagnose early and initiate treatment quickly will be important. Therapeutic management aims to reduce pain levels, prevent recurrence and regain overall function. The main management component is prevention,

and its task is to educate the patient on proper health-promoting behavior and raise awareness related to the pathomechanism of spinal pain [18].

Nowadays, spinal pain is treated surgically or conservatively. Unfortunately, conservative treatment brings the expected results in the majority of patients, and only 2% of all people with pain are qualified for surgery [19]. An important adjunct to therapy is SPA treatment, which, because of the comprehensiveness of its approach, makes it possible to combine the positive effects of physiotherapy with the influence of climatic and environmental conditions on improving patients' health [20].

This study aimed to evaluate the pain complaints and functional performance of patients with lumbosacral spinal pain syndrome before and after a three-week rehabilitation program. The mean pain level in the study group after the rehabilitation camp decreased by 1.57 on the VAS scale (5.18 in Measure 1. and 3.61 in Measure 2.). Notably, in as many as 78.89% of the subjects, pain complaints decreased.

Bolach et al. [20] also showed that three weeks of spa physiotherapy reduced pain intensity in 65% of the patients with degenerative changes of the lower spine studied. The pain intensity reduction value found in the group of fifty-six men was statistically significantly higher (t=2.99; p=0.003) than in the group of fifty-four women. Pain levels decreased by 0.85 on the VAS scale in women and by 1.40 in men.

Similarly, Szafraniec and Jozefowski [21] noted that in both study groups of patients with lumbosacral spinal discopathy, pain decreased by an average of 1.3 on the VAS scale regardless of the different form of kinesiotherapy provided (15 G1 patients - water gymnastics, 15 G2 patients - general gymnastics). The G2 group had the highest average pain level before the turnout, which was 5.1, but after three weeks of rehabilitation, it dropped to 3.9 on the VAS scale. The G1 group had 4.9 before the turnout and 3.6 on the VAS scale after.

Also, Wojcik et al [22] demonstrated the positive effect of SPA treatment in patients diagnosed with lumbosacral spine pain syndrome. They reported a statistically significant reduction in pain levels and an increase in functional capacity in a group of thirty-one patients in a rehabilitation camp, who achieved a reduction in pain levels from 5 to 2 on the VAS scale after rehabilitation was conducted for three weeks. However, in the twelve-patient control group not participating in the spa treatment or any other form of physiotherapy, there was no statistically significant reduction in pain after three weeks, and they remained at a level of 3 on the VAS scale.

The scientific reports analyzed, as well as the results of our own research, indicate that rehabilitation in a spa setting affects reducing pain levels. It is worth considering whether other factors, such as being away from one's permanent residence and changing one's daily routine (work, rest, and forms of relaxation), also had an impact on reducing these complaints. One would have to consider whether this could have an impact and how much of an impact it would have on reducing pain.

After three weeks of physiotherapy, our study noted a reduction in the mean SI index by 0.02 (1.16 measure 1. and 1.14 Measure 2.) in the TST test and that in 77.78% of the subjects, the index was within the normal range and not exceed 1.15. Reviewing the literature, it is noticeable that there is a lack of research on the distribution of lower limb loading symmetry in patients with lumbosacral pain residing in rehabilitation camps. In 2008, Sipko et al. [23] studied postural balance in the early postoperative period in forty patients with herniated nucleus pulposus in the lumbar spine using the PEL 3 platform. The authors found that postural imbalance in the frontal plane is reduced in the early postoperative period in the patients studied. Also, they showed that there is the same asymmetry in the ground pressure forces of the feet as before surgery due to the radiation of pain to one of the lower extremities [23].

Our research in the TUG test also showed a 0.82-second reduction in the average time required to complete the test (6.84 seconds measurement 1. and 6.02 seconds measurement 2.) and that 62.22% of the patients studied completed the test in less time after three weeks of rehabilitation treatment. Kulinski [24] also studied the effect of three weeks of treatment in an outpatient setting on the performance of the TUG test in 120 patients with spinal and peripheral joint pain syndrome aged 64-82 years. The researcher noted that after the treatment, there was an increase in the percentage of patients performing the test below 14 seconds, which was 25.2%, and patients performing below 20 seconds, which was 17.9%. The percentage of patients performing the test above 20 s remained unchanged at 56.9%.

As in previous tests from our own study, there was a 6.48 cm reduction in mean distance (22.38 cm in Measure 1 and 15.9 cm in Measure 2) in the FTF test after three weeks of physiotherapy. After three weeks of rehabilitation, 72.22% of the patients studied achieved a smaller distance in the FTF test. The study by Szafraniec and Jozefowski [21] also proved an improvement in the FTF test on average by about 10 cm in patients attending a three-week rehabilitation turnout regardless of the kinesiotherapy provided. The authors showed that after the rehabilitation camp, the group participating twice daily in water gymnastics classes had a score that was 9.2 cm lower, reaching 19.8 cm at the last stage of the study. In contrast, the group participating twice a day in general gymnastics classes had a score of 12.6 cm lower and was 24.3 cm at the last stage of the study.

The FTF test is one of the more commonly used diagnostic tests for patients with lumbosacral back pain syndrome. It is a quick and easy test that can catch the onset of disorders. It should be emphasized that this is a preliminary test in the diagnostic process, and disorders from structures other than the lumbosacral spine may affect its performance. A more reliable test of lumbar spine mobility is the Schober test. Ignasiak and Ziółkowska-Łajp [25] applied this test to female patients at the CRR KRUS in Szklarska Poreba. They showed that after three weeks of physiotherapy, there was a statistically significant increase in lumbar spine mobility of 0.92 cm in women before 49 and 1.02 cm in women after 49.

Bolach et al. [20] also studied the effect of three weeks of SPA physiotherapy on the performance of the Schober test in study patients with degenerative changes of the lower spine. It was shown that there was a statistically significant improvement in the Schober test score among patients of both genders after physiotherapy. The mean improvement in the range of forward flexion of the lumbar spine was greater in the men's group (0.62 cm) compared to the women's group (0.47 cm), but the difference in mean changes between patients of both sexes was not statistically significant ($t = 1.70$; $p = 0.09$).

Undoubtedly, the review of the literature and the results of our own research indicate the effectiveness of rehabilitation in a sanatorium setting (SPA). A three-week stay influences the reduction of lumbosacral spine pain, improvement of functional capacity, and consequently, improvement of the patient's quality of life. Furthermore, SPA treatment can be an important link in combating lower back pain syndromes.

Conclusions

The data collected confirms that the three-week rehabilitation program had an impact on reducing the level of pain and increasing the level of functional performance. It was also shown that the gender of the subjects did not affect the level of pain and the performance of most functional tests (Measures 1. and 2. for the TUG test, Measure 1. TST test, Measure 1. FTF test), while for Measure 2. TST test and FTF test, the influence of gender on the performance of the above tests was noticeable. It was also observed that BMI affected the level of pain experienced and performance on functional tests. Those with a higher BMI experi-

enced less pain and scored better on the FTF test and Measure 2 of the TUG test, while they had worse results on the TST test and Measure 1 for the TUG test. The results of the present study indicate that the level of pain experienced affected the performance of functional tests. Those with higher pain levels scored lower on the TST, TUG, and FTF tests.

References

1. Piernikowska A, Ostrowski J. Nursing care for patients with acute lumbar spine pain. Innow Pielęg Nauk Zdr. 2017; 94–109.
2. Lubkowska W, Mroczek B. Current trends in the rehabilitation of low back pain – a systematic review. Pomeranian J Life Sci 2018; 64 (1): 152–160.
3. Zwierzchowska A, Tuz J. Evaluation of the impact of sagittal spinal curvatures on musculoskeletal disorders in young people. Med Pracy 2018; 61 (1): 29–36.
4. Milanow I. Spinal pain syndrome [Zespół bólowy kręgosłupa]. Pediatr Med Rodz. 2014; 10 (3): 253–264.
5. Kassolik K, Rajkowska-Labon E, Tomasik T, Pisula-Lewandowska A, Gieremek K, Andrzejewski W. et al. Rekomendacje Polskiego Towarzystwa Fizjoterapii, Polskiego Towarzystwa Medycyny Rodzinnej i Kolegium Lekarzy Rodzinnych w Polsce w zakresie fizjoterapii zespołów bólowych kręgosłupa w podstawowej opiece zdrowotnej. Fam Med Prim Care Rev. 2017; 19 (3): 1-12.
6. Kubicki P, Pop T, Boychuk T. Effectiveness of rehabilitation in the treatment of pain syndromes [Skuteczność rehabilitacji w leczeniu zespołów bólowych]. Young Sport Sci Ukraine 2012; 113–120.
7. Dobrzeniecka A, Pogorzała AM. Selected issues of the prevention and management of the pain syndrome in the lumbar-sacral spine [Wybrane zagadnienia profilaktyki i postępowania w zespołach bólowych odcinka lędźwiowo-krzyżowego kręgosłupa]. Horyzonty Współ Fizjoter. 2016; 239–241.
8. Bochenek A, Reicher M. Anatomia człowieka. Tom I. Anatomia ogólna. Kości, stawy i więzadła, mięśnie. PZWL, Warszawa 2021; pp: 219-266.
9. Wróblewska I, Bieszcz-Płostkonka K, Błaszczuk J, Kurpas D. Effectiveness of rehabilitation in the degenerative spinal diseases. Fam Med Prim Care Rev. 2014; 16: 35–38.
10. Solecki L. Complaints of low back pain among private farmers exposed to whole body vibration. Med. Pracy 2014; 65 (1): 55–64.
11. Michalik M, Kowalska M, Kotyla P, Owczarek AJ. Frequency of hospitalization due to low back pain syndrome in Poland and European countries. Pom J Life Sci. 2015; 61 (2): 214–219.
12. Ignasiak T, Ziółkowska-Łajp E. Assessment of the direction of changes in the range of motion in joints as a result of sanatorium treatment of rural women with musculoskeletal pain. Med Ogóln Nauk Zdr. 2012; 18 (2): 85–91.
13. Kilon M, Przedborska A, Kostka J, Raczkowski JW. Comparative analysis of the functional status of women with osteoarthritis of the hip or knee joint. Fizjoter Pol. 2021; 21 (3): 134–142.
14. Wojtków M, Korcz K, Szotek S. Assessment of body posture and feet load distribution in sport shooters [Ocena postawy ciała i symetrii obciążenia stóp u zawodników uprawiających strzelectwo sportowe]. Akt Probl Biomech. 2016; 10: 91–98.
15. Przedborska A, Misztal M, Raczkowski J. Evaluation of therapeutic effectiveness of diathermy in patients with degenerative disease of the lumbar spine. Fizjoter Pol. 2021; 2: 70-75.

16. Callegari B, Garcez DR, Júnior ATVDC, Almeida ADSSC, Candeira SRA, do Nascimento NIC, et al. Gait patterns in ischemic and hemorrhagic post-stroke patients with delayed access to physiotherapy. Hong Kong Physiother J. 2021; 41 (2): 77–87. doi: 10.1142/S1013702521500074.
17. Kruczyński J. Wiktora Degi ortopedia i rehabilitacja. Wydanie II. Wydawnictwo PZWL. Warszawa 2019; pp. 495-500.
18. Kałużna A, Kałużny K, Wołowiec Ł, Płoszaj O, Żukow W, Kochański B. et al. The prevention of spinal pain - a systematic review. J Educ Health Sport. 2017; 912-926.
19. Karski T, Karski J. Bóle krzyża-problem neurologiczno-ortopedyczny. Objawy, przyczyny, leczenie i profilaktyka. Wydawnictwo Czelej 2016; pp. 9-16.
20. Bolach B, Szafraniec R, Bolach E. Effect of SPA therapeutic improvement on the functional status of patients with degenerative changes of the lower spine [Wpływ uzdrowiskowego usprawniania leczniczego na stan funkcjonalny pacjentów ze zmianami zwyrodnieniowymi dolnego odcinka kręgosłupa]. Innowacje w Fizjoterapii tom II; Lublin 2015: pp. 57-65.
21. Szafraniec R, Józefowski P. Comparison of the effects of two rehabilitation programs on spinal mobility and pain intensity in patients with L-S discopathy [Porównanie wpływu dwóch programów rehabilitacji na ruchomość kręgosłupa i intensywność bólu u pacjentów z dyskopatią odcinka L-S]. Innowacje w Fizjoterapii t.II; Lublin 2015; 30-40.
22. Wójcik G, Skalska-Izdebska R, Kolbuszewska A, Kolbuszewska A, Szulc A. The effect of comprehensive therapy Spa for the treatment of pain syndrome the spine lumbosacral. J Educ Health Sport. 2016; 6(12): 71–83.
23. Sipko T, Chantsoulis-Supińska M, Żmuda M, Zwoliński J. Postural balance in patients with disc disease in the early postoperative period [Zrównoważenie postawy ciała u pacjentów z chorobą dyskową we wczesnym okresie pooperacyjnym]. Medsportpress 2008; 10: 226–237.
24. Kuliński W. Physiotherapy in the prevention of disability in elderly patients. Gerontolol Pol. 2017; 25: 39–44.