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Vojta Therapy and Conservative Physical Therapy versus Physical Therapy Only for Lumbar Disc Protrusion: A Comparative Cohort Study from Romania

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Abstract: Background: Lumbar disc herniation (LDH) is a common condition caused by degenerative lesions of the lumbar intervertebral discs, due to aging or lifting weights. For patients with LDH, a comparative study was conducted to understand the benefits of Vojta therapy and conservative physical therapy versus physical therapy only. The aim of this paperwork was to help physicians select interventions which are most appropriate for this disease. Methods: Seventy-seven patients with LDH from two cohorts were included in analysis (Group A and Group B). Group A benefited from 30 min of Vojta therapy procedures, in addition to the usual physical therapy treatment, and group B received a conservatory physical therapy program. The subjects were assessed with the Visual Analog Scale (VAS), Oswestry Disability Index (ODI), mobility tests, muscle strength tests and the Nottingham Health Profile (NHP) questionnaire. Results: Pain intensity and disability decreased in both groups (p = 0.000 in experimental group and 0.047 in control group for VAS score and p = 0.000 for ODI score in both groups). Moreover, mobility, strength and health-related quality of life scores increased significantly both in groups A and B (p = 0.000 in both). Conclusions: After two weeks of interventions, we saw greater differences in pain intensity, disability level, mobility, strength, and health-related quality of life scores in both study groups, but not across the groups. This was not the case between the groups.

Keywords: rehabilitation; disc herniation; Vojta therapy; pain; disability

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1. Introduction

Lumbar disc herniation (LHD) is a common condition caused by degenerative lesions of the lumbar intervertebral discs, due to aging or lifting weights. As we age, the intervertebral discs become less flexible, more dehydrated and more prone to protrusion, even with minor lifting or twisting. An increased incidence among professionally active people has been reported, with the lower lumbar area being the most affected (L4-L5, L5-S1) [1].

The prevalence of lumbar disc herniation differs from one area to another. The reported number of prevalent cases was high in Central Europe (mean: 12.57%), North Africa/Middle East (mean: 9.9%), and low in the Caribbean (mean: 5.67%), followed by Central Latin America (mean: 5.62%) [2–5].

Numerous risk factors have been incriminated in the occurrence of lumbar spine disorders, including: obesity, physical inactivity, smoking, faulty postures, heavy physical work and incorrect lifting techniques. Moreover, the normal process of aging is responsible for the majority of changes in the intervertebral disks and, under these conditions, at a certain point, minimum loads of the lumbar spine can lead to acute or chronic back pain.

LHD causes disability, decreased mobility and the quality of life, with psychological and socioeconomic impacts, such as depression, stigma or absenteeism at work with financial concerns [6,7].

In addition to the above-mentioned symptoms, many patients become chronic users of analgesics, anti-inflammatories and antidepressants, presenting many serious adverse effects following their long-term use.

Considering the long persistence of the symptoms, the remitting nature of the pathology and the considerable burden on health systems, numerous studies have been carried out [8–11].

Much research has been conducted examining the effectiveness of various interventions commonly used to manage LHD, including bed rest, using a back brace, traction, analgesics, muscle relaxants, epidural steroid injections, electrotherapy, acupuncture, exercise therapies or physical therapies and surgery. Usually, surgery is recommended when patients do not register any improvement in symptoms or when hernia complications occur. However, several studies concluded that surgery led to better short- or mid-term outcomes and decrease of symptoms, but long-term results were comparable to non-operated patients with LDH [12–16].

One of the rehabilitation techniques proposed for patients with LBP, but insufficiently studied, is the kinesiology concept developed by Prof. Vaclav Vojta in 1959. Vojta therapy (VT), also known as reflex locomotion, was first used in neuropediatrics to treat children with cerebral palsy [17,18].

Since then, this therapy has continuously developed and acquired a wide application in various conditions, including peripheral neuropathy, stroke, spinal and brain damage, low back pain, herniated disc, urinary incontinence and pelvic floor dysfunction [19].

Vojta therapy consists of stimulating certain areas of the body by applying pressure to activate behavioral patterns. Dr. Vojta claimed that neural networks between the brainstem and the spinal cord can become functionally affected, leading to the altered biomechanics of movement. Therefore, the repeated stimulating of these "reflex-type" movements could "unlock" or develop "new access paths", and restore the functionally blocked neural networks between the brainstem and the spinal cord [20].

Low back pain patients typically present an imbalance in the core muscle tone that worsens pain and contributes to postural instability. VT can activate the core muscles and the deep spinal muscles, establishing a balance between these muscles and, consequently, an optimal trunk stabilization and postural control [21].

The activation of the abdominal and paravertebral muscles causes the physiological stretching of the lumbar spine by stretching and rotating its segments, thus reducing the spinal loading. In this way, this therapy provides a worthwhile improvement in common LDH symptoms, such as pain and physical function, including mobility and disability. Finally, the repetition of muscle activation allows the integration of innate physiological patterns of movement into the spontaneous mobility [22].

Studies conducted on the efficiency of physical therapy in patients with disc herniations during recent years have substantially increased our understanding of this therapies; but, nevertheless, information about Vojta therapy benefits on patients with LDH is sparse. Vojta therapy and conservative physical therapy are often used to decrease pain and disability in patients with low back pain, which is the most common symptom of LDH [22,23]. However, there has been no study comparing both therapies with each other in this scenario.

The aim of this study was to determine the effectiveness of Vojta therapy with conservative physical therapy, versus physical therapy only, on pain and functional disability reduction in patients with LDH.

2. Materials and Methods

2.1. Study Design and Participants

In this prospective cohort study, patients from the Băile Felix Recovery Hospital (Romania) were consecutively recruited between October 2020 and January 2021. The study was approved by the local Ethics Committee (approval no. 9406/13.10.2020) and was conducted in accordance with the principles of the Declaration of Helsinki. All participants provided their written consent before participating in the study.

Inclusion criteria were ages of 30–75 years, an MRI-confirmed diagnosis of lumbar disc herniation, and the presence of low back and/or leg pain due to disc herniation. Exclusion criteria for the study were: spinal tumor, spondylodiscitis, osteoporotic fractures, narrowed spinal canal (stenosis), inflammatory rheumatic diseases, and history of back surgery.

A total of 125 patients met the inclusion criteria. From this, 77 patients signed the written consent form before participating in the study. Participants from two cohorts were included in the analysis.

First, we followed 38 patients who benefited from a complex recovery program, composed of the conservatory physical therapy program combined with Vojta therapy procedures (Group A). The second cohort included patients who only followed the conservative physiotherapy program (Group B).

The conservatory physical therapy program was the same for both cohorts, consisting of one treatment session daily, five times per week, and a total of 10 session.

The physical therapy program lasted 50 min and included mobility and strength exercises and motor control exercise. The exercises focused on strengthening the trunk and pelvic floor muscles, and functional restoration techniques. Physiotherapy exercises were individualized and adapted according to the patients' specific impairments and the frequency and intensity of the exercises were adapted according to the progress.

Patients from group A benefited from 30 min of Vojta therapy procedures, in addition to the regular physiotherapy program. The physiotherapist, who worked with both groups, had attended special courses and obtained certification from the Vojta International Society.

The Vojta therapy program was based on the reflex locomotion method, with two complex coordination techniques: reflex rolling (with the two variants of the initial position: supine and side-lying) and reflex creeping from the prone position [24].

Each technique started with a minute of rest in the initial position, after which the stimulation was performed. Reflexes are activated by applying painless, but firm and sustained pressure to specific stimulation points [17]. After releasing the pressure, the patient remains in the same position for one minute, with no stimulus.

Reflex rolling from the supine position was as follows: the initial position for the patients was in dorsal decubitus. They were comfortably laid down on the back, with open eyes the head rotated 30° toward the side where the stimulation would be applied. After the first minute of resting, the physiotherapist stimulated the chest zone by applying pressure between the 7th and 8th rib.

Reflex rolling from the side-lying position was as follows: the initial position for the patients was in the lateral decubitus. The physiotherapist stimulated the medial scapular border and the anterior superior iliac spine.

Reflex creeping from the prone position was as follows: the initial position for the patients was in the ventral decubitus. The patients received a continuous reflex locomotion stimulus on the following areas: medial humeral epicondyle, acromion, the chest zone, scapular medial border, iliac spine, medial femoral epicondyle, calcaneus and gluteus.

2.2. Assessments

Baseline evaluation included demographic data, such as age, anthropometric characteristics, gender and living place. In addition, the presence of other symptoms, comorbidities and pain medication were noted.

- The primary outcome measures

The primary outcome was pain, assessed by a Visual Analog Scale (VAS), and disability, evaluated by the Oswestry Disability Index (ODI).

The visual analogue scale (VAS) was used to determine the severity of pain [25]. The pain intensity ranged from 0 to 10, where 0 = no pain, 1–3 = mild pain; 4–7 = moderate pain; 8–9 = severe pain and 10 = the worst possible pain.

The Oswestry Disability Index (ODI) was used to assess the functional status and indicate the limitation in everyday life activities. The ODI is a questionnaire comprised of 10 items (scores 0–5) [26]. The higher scores indicate a more severe disability (bedridden).

- The secondary outcome measures

The secondary outcomes included the spinal mobility, hip flexion mobility, the flexion and extension muscle strength of the trunk, and the life quality.

The mobility was assessed using the finger-to-floor distance (FTF), trunk right lateral flexion (TRLF), trunk left lateral flexion (TLLF) and hip flexion (HF) testing [27].

To assess the muscle strength, we used the manual muscle technique for: muscle strength trunk forward flexion (MSTFF), muscle strength trunk extension (MSTE), muscle strength trunk right lateral flexion (MSTRLF) and muscle strength trunk left lateral flexion (MSTLLF) [28]. The manual testing of muscle strength uses a scale from 0 to 5, as follows: 0 = no visible contraction; 1 = visible contraction without movement of the limb; 2 = enough strength to produce motion, but not against gravity; 3 = sufficient strength to produce motion against gravity, but does not support additional resistance; 4 = enough strength to produce motion against gravity and additional resistance; 5 = normal muscle strength. For testing the muscle strength 4–5 involved in the flexion of trunk, the position of the patient was supine and the physiotherapist placed a counter resistance with the palm on the patient's chest. For evaluation of muscle strength 3, the patient remained supine and the physiotherapist did not apply resistance to the flexion movement. The patient performed the flexion and the physiotherapist examined the patient only visually. For testing muscle strength 4–5 involved in the extension of trunk, the position of the patient was ventral decubitus and the physiotherapist placed a counter resistance, with the palm between the shoulder blades. For evaluation of muscle strength 3, the patient remained in ventral decubitus and the physiotherapist did not apply resistance to the extension movement. The patient performed the movement and the physiotherapist examined the patient only visually. For testing the muscle strength trunk lateral flexion, the position of the patient was lateral decubitus, on the side opposite to the tested one.

The health-related quality of life (HRQL) was evaluated using the Nottingham Health Profile (NHP) questionnaire. The NHP is a patient-reported questionnaire, composed of 38 items divided into six subareas (energy level, pain, emotional reaction, sleep, social isolation, and physical abilities) [29]. NHP scores are calculated by averaging domain scores. The items are scored from 0 to 100, where higher scores indicate a worse quality of life.

2.3. Study Size

Because we estimated that in the rehabilitation hospital there is an average number of 100 patients with low back pain per month, we used this population size as a primary reference for establishing the sample size. We used an online sample size calculator, available at: http://riskcalc.org:3838/samplesize/, (accessed on 15 October 2020). We considered the 95% confidence level, the z score for this confidence level being 1.96. According to these parameters, 80 subjects were chosen for the population size.

2.4. Statistical Methods

For the statistical analysis, we used the Statistical Package for Social Sciences (SPSS) for Windows version 15.0.0. The mean and standard deviation was used for the quantitative analysis of the numerical variables and the percentage and mean for the categorical variables. The Kolmogorov–Smirnov test was used to analyze the data distribution. Since there was a normal distribution of data ($p \geq 0.05$), we used the independent samples T-test for comparing the initial values of both experimental and control groups. In order to test the normality of distribution across the two groups of subjects regarding gender, presence of radiculopathy, living place, profession activity level, co-morbidities and pain medication, the Chi2 test for homogeneity was performed.

To compare the pretest and posttest assessment data for both groups, we used the one-way ANOVA with repeated measures, since there was a normal distribution of the data and the assumption of sphericity was met. In order to analyze the difference between posttest values of groups A and B, we used a one-way ANOVA between subjects.

A partial eta squared was used for estimating the magnitude of the effect for the one-way ANOVA between subjects, and also for the one-way ANOVA with repeated measures. Statistical hypotheses were verified at the significance level of $p = 0.05$.

3. Results

In both groups, the data distribution was consistent for age, body fat (as body mass index) and time overdue between the patient diagnosis and the beginning of treatment, radiculopathies (Table 1). There is not a significant difference for data homogeneity between groups A and B for gender-specific, living place, profession, activity level, comorbidities, pain medication and the presence of radiculopathy ($p \geq 0.05$).

Table 1. Demographic characteristics (mean ± SD/%), time overdue between diagnosis and treatment (mean ± SD), and radiculopathy (%) (n = 77).

Characteristics	Group A (n = 38)	Group B (n = 39)	*p*
Age (years)	50.24 ± 12.25	50.33 ± 14.02	0.908
BMI (kg/m^2)	26.53 ± 5.07	27.90 ± 5.18	0.685
Time elapsed (months)	10.00 ± 9.79	9.90 ± 9.02	0.920
Gender (%) men	34.2	38.5	0.440
women	65.1	61.5	
Living place (%) urban	65.8	66.7	0.563
rural	34.2	33.3	
Comorbidities (%) yes	81.6	84.6	0.479
no	18.4	15.4	
Radiculopathy (%) right	34.2	33.3	0.717
left	21.1	15.4	
bilateral	44.7	51.3	
Pain medication (%) yes	84.2	76.9	0.402
no	15.8	23.1	

At the initial assessment there was no significant difference between the two groups for pain intensity, muscle force, range of motion and disability level (Table 2).

The data analysis for group A reveals that there are significant differences between the pretest–post-test results for VAS = Visual Analog Scale [F(1,37) = 4.219, $p = 0.000$], ODI = Oswestry disability index [F(1,37) = 64,751 $p = 0.000$], FTF = trunk mobility on flexion [F(1,37) = 14.658, $p = 0.000$], HF = hip flexion [F(1,37) = 34,068 $p = 0.000$], MSTFF = muscle

strength trunk forward flexion [F(1,37) = 6.136 p = 0.018]; MSTE = muscle strength trunk extension [F(1,37) = 52.811, p = 0.000]; HRQL = health-related quality of life [F(1,37) = 105.207, p = 0.000].

There is not a significant difference between the initial and final results for mobility on lateral flexion of the trunk: TRLF [F(1,37) = 0.875, p = 0.356], muscle strength on lateral flexion of the trunk MSTRLF [F(1,37) = 0.059, p = 0.628], MSTLLF [F(1,37) = 0.109, p = 0.774].

Table 2. Descriptive statistics (mean ± SD) and comparison of the initial parameters (confidence interval 95%) between the two groups.

Parameters	Group A (n = 38)	Group B (n = 39)	p	95% CI [Lower/Upper]
VAS (score)	6.39 ± 2.331	6.87 ± 1.838	0.321	−1.429/0.475
ODI (score)	20.58 ± 10.859	20.82 ± 10.123	0.920	−5.006/4.523
FTF (cm)	23.76 ± 18.807	27.46 ± 17.111	0.369	−11.857/4.460
TRLF (cm)	42.58 ± 2.678	41.05 ± 4.883	0.094	−0.267/3.322
TLLF (cm)	42.18 ± 4.152	41.23 ± 5.446	0.391	−1.249/3.156
HF (degree)	82.89 ± 19.920	70.51 ± 27.381	0.026	1.488/23.276
MSTFF (score)	3.63 ± 0.819	3.56 ± 0.754	0.641	−0.290/0.425
MSTE (score)	3.37 ± 0.970	3.44 ± 0.821	0.836	−0.475/0.340
MSTRLF (score)	3.45 ± 0.978	3.49 ± 0.854	0.878	−0.456/0.377
MSTLLF (score)	3.42 ± 1.030	3.49 ± 0.790	0.886	−0.482/350
HRQL (score)	27.68 ± 13.449	27.00 ± 13.578	0.825	−5.452/6.821

VAS = Visual Analog Scale; ODI = Oswestry disability index; FTF = finger-to-floor distance; TRLF = trunk right lateral flexion; TLLF = trunk left lateral flexion; HF = hip flexion; MSTFF = muscle strength trunk forward flexion; MSTE = muscle strength trunk extension; MSTRLF = muscle strength trunk right lateral flexion; MSTLLF = muscle strength trunk left lateral flexion; HRQL = health-related quality of life; $p < 0.05$.

The comparison of initial and final values for group B shows that there are significant differences for VAS = Visual Analog Scale [F(1,38) = 2.984, p = 0.047], ODI = Oswestry disability index [F(1,38) = 85.146, p = 0.000], FTF = finger-to-floor distance [F(1,38) = 40.658, p = 0.000], HF = hip flexion [F(1,38) = 0.218, p = 0.000]; MSTE = muscle strength trunk extension [F(1,38) = 40.338, p = 0.000]; HRQL= health-related quality of life [F(1,38) = 125.265, p = 0.000]. There is not a significant difference between pretest and post-test values for mobility on lateral flexion of the trunk TRLF [F(1,38) = 0.443, p = 0.509] and TLLF [F(1,38) = 0.218, p = 0.643]; trunk muscle strength MSTFF [F(1,38) = 0.039, p = 0.844], MSTRLF [F(1,38) = 0.150, $p < 0.700$] and MSTLLF [F(1,38) = 0.394, $p < 0.534$].

For group A, after two weeks of physiotherapy in association with Vojta therapy (Table 3), significant changes were registered for pain intensity, range of motion, muscle force and disability level, meaning that after intervention, the p value shows the significant difference for VAS, ODI, FTF, HF, MSTFF, MSTE and HRQL. The data written in bold characters emphasize a statistically significant difference for patients from each group (group A changes and group B changes).

The comparison of the final assessment scores between the two groups shows that none of the studied variables presented significant differences.

Table 3. The outcome changes in both groups after two weeks of intervention (confidence interval 95%, mean ± SD).

	Group A (n = 38)		Group B (n = 39)			Group A Changes			Group B Changes		Inter-Action
	Baseline	Post	Baseline	Post	*p*	Effect Size	95% CI Lower/Upper	*p*	Effect Size	95% CI Lower/Upper	*p*
VAS	6.87 ± 1.838	3.33 ± 2.017	6.39 ± 2.331	3.74 ± 1.117	**0.000** *	**0.73**	2.876/4.211	**0.047** *	0.10	1.940/3.376	0.401
ODI	20.58 ± 10.859	13.00 ± 8.539	20.82 ± 10.123	10.38 ± 9.054	**0.000** *	**0.63**	5.671/9.487	**0.000** *	**0.69**	8.146/12.725	0.169
FTF	23.76 ± 18.807	16.26 ± 17.071	27.46 ± 17.111	18.15 ± 19.682	**0.000** *	**0.28**	3.531/11.469	**0.000** *	**0.51**	6.335/12.281	0.654
TRLF	42.58 ± 2.678	39.00 ± 4.430	41.04 ± 4.883	37.90 ± 8.084	0.356	**0.23**	3.324/4.834	0.509	0.12	0.692/5.616	0.462
TLLF	42.18 ± 4.152	38.42 ± 4.452	41.23 ± 5.446	38.62 ± 5.514	0.097	**0.38**	2.647/4.880	0.643	**0.30**	1.715/3.516	0.866
HF	64.55 ± 22.002	82.89 ± 19.920	55.38 ± 28.013	70.51 ± 27.381	**0.000** *	**0.47**	11.975/24.709	**0.000** *	**0.38**	8.890/21.367	0.115
MSTFF	3.63 ± 0.819	4.11 ± 0.764	3.56 ± 0.754	4.00 ± 0.688	**0.018** *	0.14	−0.657/−0.291	0.844	0.07	0.664/0.228	0.527
MSTE	3.37 ± 0.970	3.84 ± 0.789	3.44 ± 0.821	3.90 ± 0.680	**0.000** *	**0.58**	0.672/0.275	**0.000** *	**0.51**	0.641/0.282	0.743
MSTRLF	3.45 ± 0.978	4.05 ± 0.868	3.49 ± 0.854	3.92 ± 0.774	0.628	0.00	0.829/0.382	0.700	0.00	0.615/0.257	0.491
MSTLLF	3.42 ± 1.030	4.00 ± 0.805	3.49 ± 0.790	3.79 ± 0.707	0.774	**0.48**	0.790/0.368	0.534	**0.50**	0.651/0.323	0.882
HRQL	27.68 ± 13.449	17.95 ± 11.045	27.00 ± 13.578	18.31 ± 13.638	**0.000** *	**0.74**	7.004/12.469	**0.000** *	**0.76**	6.793/10.591	0.899

VAS = Visual Analog Scale; ODI = Oswestry disability index; FTF = finger-to-floor distance; TRLF = trunk right lateral flexion; TLLF = trunk left lateral flexion; HF = hip flexion; MSTFF = muscle strength trunk forward flexion; MSTE = muscle strength trunk extension; MSTRLF = muscle strength trunk right lateral flexion; MSTLLF = muscle strength trunk left lateral flexion; HRQL = health-related quality of life; * $p < 0.05$. The data written in bold characters emphasize a statistically significant difference.

4. Discussion

The ultimate goal of this study was to see if Vojta therapy combined with physical therapy had a better effect than physical therapy alone in individuals with lumbar disc herniation. We expected that combining Vojta therapy with physical therapy would result in improved pain and functional impairment results after 2 weeks of intervention.

Our study's findings show that pain (VAS score) lowers significantly following therapy in both groups. Furthermore, the lumbar function of both groups was improved, and the disability levels were much lower than before therapy.

After either Vojta therapy paired with physical therapy, or physical therapy alone, the outcomes for mobility, strength, and health-related quality of life improved dramatically.

We discovered a significant improvement in the analyzed variables within each group at the final evaluation.

Furthermore, the comparison of the groups revealed no significant differences in the examined parameters, with the exception of pain intensity, which dropped more in the group that benefited from Vojta therapy than in the group that followed only the conservative physical therapy program, although this was not significant.

A recent study found that Vojta therapy was beneficial in lowering pain and impairment, as well as improving muscle weakness and flexibility in lumbo-sciatica patients, after 15 days of treatment [22].

The transverse abdominal muscle has aberrant contraction patterns or timing in patients with low back pain, as well as a diminished cross-sectional area. The transverse abdominal and diaphragm are essential trunk-stabilizing muscles that affect spinal stiffness, either directly through muscle contraction, or indirectly through increased internal abdominal pressure [30,31].

In their work, Ha SY and colleagues (2016) indicate that by stimulating the breast zone using Vojta techniques, the activation of the transverse abdominal and diaphragm muscles rises in normal individuals [21]. These findings suggest that in healthy individuals, stimulation of the breast zone could lead to the activation of nearby muscles for core stability influencing postural control. According to research, muscle exercise that focuses on activating local muscles, improves the lumbar spine segmental stability and considerably reduces symptoms related to low back pain [31–33].

Increased trunk stability has been demonstrated to have favorable physiological effects on the tissues surrounding the lumbar disc. Functional improvement is the result of trunk stabilization, which can be clinically useful in patients with lumbar disc herniation [34,35].

Our study confirms that physical therapy, through various methods, conventional or special, can help patients with lumbar disc herniation. Following functional evaluation,

the physical therapist specialized in lumbar disk disease recovery must choose the most suitable methods for the patient's rehabilitation.

The current study has some significant limitations. First, the intervention time was limited to two weeks. One possible explanation for the comparable results in both groups is that the study time was too short. As a result, new research with a longer study period is required to investigate the changing impacts at different time points.

The second limitation is that we conducted a single-center study and had a small sample size. Therefore, more research with a bigger sample size and a comparison of treatment based on gender is required to confirm the benefits of Vojta therapy over a longer length of time.

In conclusion, we discovered substantial impacts of improving symptoms, following either Vojta therapy paired with physical therapy, or physical therapy alone, in our study.

After two weeks of interventions, we found higher differences in pain intensity, disability level, mobility, strength, and health-related quality of life scores in both groups, but not between the groups.

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Conflicts of Interest: The authors declare no conflict of interest.

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