

EFFECTS OF TRACTION THERAPY IN ADDITION TO CONVENTIONAL PHYSIOTHERAPY MODALITIES ON PAIN AND FUNCTIONALITY IN PATIENTS WITH LUMBAR DISC HERNIATION: RANDOMIZED CONTROLLED STUDY

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ABSTRACT

The aim of this study is to investigate the effects of traction therapy in addition to conventional physiotherapy modalities on pain and functionality in patients with chronic lumbar disc herniation. Patients (n=210, mean age=48.20±13.07 years, mean height=167.2±9.34 and mean weight= 74.86±13.47) were diagnosed with lumbar disc hernia through a clinical evaluation and an MRI and were graded as “protrusion or bulging lumbar herniation” according to the Macnab Classification. Patients were then randomly divided into 3 groups: the first group (n=70) underwent a hot pack (HP), Transcutaneous Electrical Nerve Stimulation (TENS), ultrasounds (US) and home exercise (HE); the second group (n=75) underwent additional traction therapy compared to the first group and the third group (n=65) was given only home exercise. Sociodemographic and clinical characteristics of patients were recorded. All assessments were done before and after the treatments (4th week). Pain and functional status of patients were evaluated. There were no significant differences between the groups (p>0.05) except for pain score (p<0.05). Comparing within groups showed improvements in all parameters after treatment (p<0.05). Although there was a significant difference between group 1 and group 3, group 2 and group 3 in pain scores (p< 0.05), there was no significant difference found for other outcome measures. It was observed that in all treatment groups, there was a significant reduction of pain and functional impairment. Traction therapy wasn't more effective than other treatments for patients with lumbar disc herniation. As a clinical outcome not only physiotherapy modalities are effective, but also specific home exercises could be considered as a form of treatment for patients with lumbar disc hernia.

Keywords: Lumbar Disc, Hernia, Traction.

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Introduction

Lumbar disc herniation (LDH) is caused by a change in the structure of a vertebral spinal disc. This latter is composed of an outer annulus fibrosus and an inner nucleus pulposus. Once the structure of the annulus fibrosus cannot effectively withstand the mechanical stresses that the environment proposes, may change its anatomical conformation and allow the inner nucleus pulposus to move, creating what is defined as an herniation.

Depending on the position and magnitude of this herniation, this may apply pressure on the roots of the spinal nerve, causing pain in the lower back or legs, numbness, tingling or weakness in the foot⁽¹⁾.

A lumbar herniated disc often requires care by spinal surgery and healthcare professionals, and may include physical therapy, medications, or secondary surgical procedures⁽²⁾. However, many studies have reported reduced symptoms in a significant number of cases through non-surgical methods⁽³⁾.

One of the approaches used in the treatment of lumbar disc hernia is traction therapy which can be combined with different physical therapy modalities. Traction should be considered as part of a treatment program that includes other physical therapy methods. The mechanical effects of traction therapy involves the reduction of the lordosis, separating the facets from each other, opening the intervertebral foramen and removing paravertebral muscle spasms⁽⁴⁾. Traction therapy reduces the pressure caused by gravity and soft tissues, and sufficient tension allows spinal separation between the intervertebral disc, the vertebra and the spinal nerve. Negative pressure within the intervertebral disc increases its hydration and reduces pressure on the nerve root by removing the force applied to the vertebral pulp. There is currently a lack of consensus evidency on the effectiveness of lumbar traction therapy^(5,6).

Therefore, the aim of this study was to investigate the effects of traction therapy in addition to conventional physiotherapy modalities on pain and functionality in patients with chronic lumbar disc herniation.

Materials and methods

Participants

Patients (n=210, mean age= 48.20±13.07years mean height=167.2±9.34 and mean weight=74.86±13.47) were diagnosed with chronic lumbar disc hernia after clinical evaluation and Magnetic Resonance Imaging (MRI) and were graded as “protrusion and bulging lumbar herniation” according to the Macnab Classification⁽⁷⁾.

This study was conducted between the 20th of October 2017 and the 10th of February 2018 at Baskent University Ankara Hospital Physical Medicine and Rehabilitation Outpatient clinic. All patients provided written informed consent before the study began. This study was approved with the permission of Baskent University social and humanities and arts research board (Project no:17162298.600-126).

The inclusion criteria for the patients were to be age ranging between 20 and 65, and each patients had to be diagnosed with clinical examination and radiological findings of lumbar disc herniation from at least 6 months.

All patients who had spinal stenosis and mechanical lumbar pain for 3 months, had lumbar spine surgery before the intervention, had progres-

sive neurological loss, were pregnant, hadumbilical, hiatal, inguinal hernia and active hemorrhoids, primary or metastatic spinal malignancy, infectious spondylodiscitis such as tuberculosis, brucella, inflammatory spondylitis, advanced osteoporosis, severe pulmonary and cardiovascular disease and patients who had previously undergone traction therapy were all excluded from the study.

Randomization procedure was performed using an online random-allocation software program. Patients were randomly divided into 3 groups: The first group (n=70) underwent a hot pack (HP), transcutaneous electrical nerve stimulation (TENS), ultrasound (US) and home exercise (HE); The second group (n=75) undertook additional traction therapy compared to the first group and at the third group (n=65) was given only home exercise.

Procedures

Hot pack (HP) was applied for 20 minutes conventional TENS (Enraf-NoniusBDelftechpark 39, 2600 AV, Delft, The Netherlands) was also applied for 20 minutes at60-100 Hz and a 60 pulse duration with the intensity of patients' comfort feeling, continuous ultrasound (Enraf-Nonius-B Delftechpark 39; 1-MHz; 1.5 watt/cm²) was applied to the paravertebral muscles for 10 minutes and abdominal and back strengthening exercises were given as a home exercise for all groups.

Traction (Chattanooga TX Traction Unit; intermittent, 30-sec hold, 10-sec rest 50% of body weight) was applied when patients were laid on a table in a supine position, with hips and knees at 90-degree flexion, and legs were supported. Treatment duration for all groups was 5 days per week for 4 weeks.

Sociodemographic and clinical characteristics of patients were recorded. All assessments were done before and after the treatments (4th week). Pain and functional status of patients were evaluated.

Pain, disability and functional evaluation

The Oswestry Disability Questionnaire was used to assess pain and functionality. It contains 10 questions about daily life and includes measures of pain intensity, personal care, lifting, walking, sitting, standing, sleeping, social life and travelling. Each question is rated on a scale of 0 to 5, with a higher score indicating more severe pain-related disability⁽⁸⁾.

Pain intensity was assessed using a 100 mm pain visual analog scale (VAS), on which 0 indicates absence of pain and 100 indicates unbearable pain⁽⁹⁾.

The Roland Morris Disability Questionnaire (RMDS) was used to determine the functional status and disability of patients. The RMDS is a questionnaire composed of 24 questions. The number of questions answered positively was recorded as score and calculated by adding up the number of the “yes” items, ranging from 0 (no disability) to 24 (maximum disability)⁽¹⁰⁾.

Data analysis

Demographic and clinical characteristics of the patients were described by means and standard deviations (SD) or frequencies and percentages according to the type of the variable.

Normal distribution of the data was checked with the Shapiro-Wilk test. As the outcome measures were not normally distributed, nonparametric tests were used. The Kruskal-Wallis test was used to establish differences between groups. To compare pre-treatment and post-treatment values, the Wilcoxon test was used. Mann Whitney U test was used to establish intergroup comparisons. The level of significance was set at $p = 0.05$. All analysis were performed using SPSS version 18 (IBM, Armonk, NY, USA).

G*Power package software program (G*Power, Version 3.0.10, Franz Faul, Universität Kiel, German) was used to determine the required sample size for the study. The sample size was calculated as 60 per group with the data obtained from the pain scores of a pilot study (95 % power, $d = 0.90$ effect size, $\alpha = 0.05$ type I error, and $\beta = 0.20$ type II error), however an increased number of patients was included in each group, in case of dropout.

Results

VAS: Visual Analogue Scale, p : Kruskal-Wallis Test, $p\beta$: Mann Whitney U Test

There were no significant differences between the groups ($p > 0.05$; Table 1-2) except for pain score ($p < 0.05$). Comparing within groups showed improvements in all parameters after treatment ($p < 0.05$). Although there was a significant difference between group 1 and group 3, group 2 and group 3 in pain scores ($p < 0.05$), there was no significant difference found for other outcome measures.

	n		height(m)	weight(kg)
Group 1	40	Male	1.65±9.39	74±13.86
	80	Female		
Group 2	28	Male	1.68±9.29	75±13.15
	47	Female		
Group 3	29	Male	1.69±8.95	74±13.27
	36	Female		

Table 1: Sociodemographic features of patients.

	n		Oswestry Score	Roland Morris Score	VAS Score	$p\beta$
Group 1	70	Pre	49.82±16.77	15.74±4.99	5.90±1.63	0.362
		Post	35.97±16.52	11.84±5.00	3.57±1.50	
		p	<0.001	<0.001	<0.001	
Group 2	75	Pre	50.16±17.52	14.60±4.73	6.10±1.99	0.59
		Post	32.32±16.47	10.32±4.96	3.16±1.57	
		p	<0.001	<0.001	<0.001	
Group 3	65	Pre	36.67±20.03	10.49±5.19	4.80±1.8	0.001
		Post	33.75±19.92	9.89±4.71	4.23±1.72	
		p	0.054	0.233	0.004	

Table 2: Treatment results of patients. VAS: Visual Analogue Scale, p : Kruskal-Wallis Test, $p\beta$: Mann Whitney U Test

Discussion

The main purpose of the various treatment modalities used in LDH therapy was to reduce pain, inflammation, muscular symptoms, and joint stiffness. In non-controlled studies, the efficacy of these modalities has been demonstrated⁽³⁾. Lumbar traction is a common treatment for patients with lumbar disc herniation; but its mechanism is still not fully understood. The hypothesis that the main effect of the lumbar traction has the ability to affect the fluid movement in the intervertebral disc has been proposed, nevertheless, there is still lack of consensus concerning about its effectiveness.

We found no difference between the three groups for Oswestry and Roland Morris Disability scores but we found significant improvements in both treatment groups for pain and functionality when compare before and after treatments although not seen in the control group (Exercise intervention) in our study. Choiet.al.⁽⁴⁾ similarly as our study, demonstrated that traction therapy applied with conservative physical therapy is effective on improving disability and pain.

In all groups pain intensity showed valuable decrease. We could say traction therapy in addition to conventional physiotherapy modalities has no additional effect. Also just home exercises have benefits on pain and functionality. Same as our study, other studies found^(11,12) that stretching with lumbar traction reduced pain and Oswestry disability scores in lumbar herniated intervertebral disc patients.

Leventoglu et al.^(13,14) studied the effectiveness of traction in a group of 34 patients diagnosed with acute lumbar disc hernia. The patients were randomized into two groups. The study group received 30 minutes of 50% body weight and the control group received a maximum of 20% body weight traction. In addition to traction also non-steroid anti-inflammatory drugs, hot pack, TENS and exercises were applied. At the end of 2, 4, and 12 weeks of treatment, although there was a significant improvement found in pain severity, sit and reach and straight leg raise tests in both treatment groups, had no significant difference. Depending on these, the functional capacities of the patients improved, and their insufficiencies decreased. Although, functional capacities of patients were not assessed in our study, as we observed gains in functionality in all groups.

Matthews et al.⁽¹⁵⁾ performed a double-blind study by applying traction therapy to 27 patients with sciatica. 13 patients constituted in the traction group and 14 patients in the control group. In both groups, 15 sessions were given for 5 days a week, 30 minutes a day for 3 weeks of traction therapy. For the treatment group, 36 kg of traction was applied whereas for the control group it was applied at a very low weight, not exceeding 9 kg. Patients were assessed with straight leg raise test and verbal pain. The mean pain scores improved by 28.8% in the treatment group and 18.9% in the control group. Similarly, straight leg raise test was improved in the treatment group. Although there was no statistically significant difference between the groups in terms of results, it was stated that there was a tendency to heal with traction treatment in the patients. Similar to this study, statistically significant improvements were observed in the pain levels for all three groups. Our study had some limitations. Psychological states of individuals may have affected the outcome of pain. This could be eliminated by using a scale to determine the anxiety or depression levels of the patients. Secondly, our study included

a 4-week follow-up program. However, in some studies, it was observed that traction treatment improved disability and functional status after 12 weeks, thus long-term outcomes should have been assessed.

Conclusions

In conclusion, it was observed that all treatment groups, significantly reduced pain and functional impairment. As observed in previous studies, it was concluded that the group in which the lumbar traction was applied was not different from others. As a clinical outcome we could say that not just physiotherapy modalities, but also home exercises could be considered in the treatment of pain from and functionality in patients with lumbar disc hernia.

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