

The Effects of Spinal Decompression Therapy on Pain and Disability in Patients with Chronic Low Back Pain

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Purpose: The purpose of this study was to examine the effects of spinal decompression therapy on pain and disability in patients with chronic low back pain.

Methods: Twenty patients with chronic low back pain were divided into an experimental group (spinal decompression therapy, n=10) and a control group (conservative physical therapy, n=10). Both groups were treated three times a week over a four-week period.

Results: The comparison of between-group changes post-treatment revealed statistically significant lower levels of pain and disability in the experimental group than the control group. The comparison of within each group changes before and after the treatment showed statistically significant declines in pain and disability indexes of both groups.

Conclusion: Spinal decompression therapy may be an effective intervention for improving pain and disability in patients with chronic low back pain.

Keywords: Spinal decompression therapy, Pain, Disability

INTRODUCTION

The automation of a range of tasks as a result of advances in technology and industry has increased the incidence of various musculoskeletal diseases, including chronic low back pain, by reducing levels of physical activities. Chronic low back pain refers to low back pain on a daily basis for at least 12 weeks.¹ According to the literature, chronic low back pain occurs in over 50% of the population.¹ Patients with low back pain are generally managed conservatively with various treatments, such as drug therapy, traction therapy, electrotherapy, and manual therapy.² If these treatments prove to be ineffective or the low back pain worsens, surgery may be performed.²

Among various nonsurgical treatment methods for low back pain, spinal decompression therapy has recently attracted much attention. Spinal decompression therapy is used for radiating pain associated with chronic low back pain.³ It is to reduce pressure within the disk by creating zero-gravity or negative-pressure conditions inside the disk while gradually stretching specific parts of the disk by

reducing pressure in the region affected by the low back pain.³ In addition, spinal decompression therapy has advantages such as three-dimensional traction in the body regions where general traction is not applicable, psychological stability, and the generation of effects within the range that does not put stress on the ligament and muscle.⁴ Kwon et al.⁵ reported that the application of spinal decompression therapy in patients with lumbar disk herniation was effective in reducing herniated disks and regenerating disks, and had statistically significant effects on pain reduction and increases in flexibility and muscle activity. Therefore, this study aimed to determine the therapeutic effects of spinal decompression therapy on pain and disability in patients with chronic low back pain.

METHODS

1. Subjects

The study group consisted of 20 inpatients and outpatients (males, n=8, females, n=12) at S Orthopedic Hospital with low back pain

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that had lasted at least three months. All the patients with chronic low back pain had been diagnosed by their physicians based on clinical findings of orthopedic surgeons and results of medical imaging (X-rays). The patients were divided into an experimental group (EG, $n = 10$) who were treated with spinal decompression therapy and a control group (CG, $n = 10$) who were treated with conservative physical therapy. Patients with neurological diseases, heart diseases or cardiovascular structural abnormalities, in addition to those who had experienced fractures or undergone surgery, were excluded from the study. Ethical approval for the study was granted by the institutional review board of U1 University. All the patients read and signed consent forms in accordance with the ethical standards of the Declaration of Helsinki.

2. Experimental methods

1) Measurement

All the patients were treated three times a week over a four-week period. In the CG, conservative physical therapy was applied as fol-

lows: hot packs (20 minute), interferential current therapy (100 bps, 15 minute), and ultrasound (1 MHz, 5 minute). In the EG, spinal decompression therapy was applied for 20 minute each time using a spinal decompression therapy device (MID 4M Series, WIZ Medical, Korea) in addition to the same treatment applied in the CG (Figure 1). In the EG, each patient was placed in a supine position on the treatment device. Air belts were then fastened in the pelvic and thoracic regions using an air-grip extension. A head strap was used to fix the patient's head to prevent the air belts from slipping in the attached regions. In addition, a sacrum extension device was applied to maintain lumbar lordosis. The traction power was initially at strength levels four to five, and the level was then increased at a specific rate. The duration of the traction therapy was 20 minute, and the ratio of hold time to rest time was 2:1.

2) Visual analogue scale (VAS)

The VAS was used to evaluate the degree of pain. VAS are often used in epidemiologic and clinical research to measure the intensity or frequency of various symptoms, particularly pain.⁶⁻⁹

3) Oswestry disability index (ODI)

The ODI, which comprised 10 questions, was used to evaluate the degree of disability. Each question was scored using a 0 to 5-point scale according to functional performance ability, with a higher score indicating a higher degree of disability. The score for each item was summed, and the sum was divided by the total score (i.e., 45) and presented as a percentage (%). In this study, the 9-item Korean version of the ODI, which excludes the item on sex life, was used in consideration of patients who did not have a spouse and Korea's cultural characteristics. The ODI scores are divided into 0-20% (minimal disability), 21-40% (moderate disability), 40-60% (severe disability), and 60% or above (severely disabled life).¹⁰ It is usable in a wide variety of applications as a condition-specific outcome measure of spine-related disability.^{11,12}

3. Statistical analysis

The homogeneity of variance test revealed no statistically significant differences between the groups. A paired t-test was performed to compare changes in pain and disability after the treatment within each group. An independent t-test was performed to compare differences between the groups after the treatment. SPSS, ver. 18.0 for



Figure 1. The picture of spinal decompression therapy

Table 1. Comparison of the VAS within each group

Group	Pre-treatment	Post-treatment	t	p
CG	7.30±0.34	6.60±0.31	3.28	0.01*
EG	6.80±0.47	3.70±0.42	5.89	0.00*
t	0.87	5.56		
p	0.40	0.00*		

VAS: visual analog scale, CG: control group, EG: experimental group
*p<0.05.

Table 2. Comparison of the ODI within each group

Group	Pre-treatment	Post-treatment	t	p
CG	30.22±3.29	27.77±3.13	3.16	0.01*
EG	32.22±4.36	18.66±2.85	3.74	0.01*
t	-0.37	2.15		
p	0.72	0.04*		

ODI: Oswestry disability index, CG: control group, EG: experimental group
*p<0.05.

Windows was employed for statistical processing, and the statistical significance level was set at $\alpha < 0.05$.

RESULTS

The average age, height, and weight of those in the EG group was 49.4 ± 4.6 years, 164.2 ± 9.2 cm, and 65.2 ± 12.2 kg, respectively. In the CG group, the average age, height, and weight of the patients was 51.1 ± 6.0 years, 166.2 ± 9.1 cm, and 63.8 ± 16.5 kg, respectively. After the treatment, the intergroup comparison revealed statistically significant larger declines in the VAS and ODI of the EG than the CG ($p < 0.05$)(Table 1, 2). The intragroup comparison showed statistically significant declines in the VAS and ODI ($p < 0.05$)(Table 1, 2).

DISCUSSION

There is increasing interest in nonsurgical treatments for chronic low back pain due to concerns about surgical-related problems or side effects. Among various conservative therapy treatment options, spinal decompression therapy has attracted particular attention. In the present study, the application of spinal decompression therapy was associated with statistically significant improvements in pain and disability.

In a study of 60 patients with low back pain and a diagnosis of lumbar disk herniation, Huh¹³ reported that spinal decompression therapy was effective in reducing pain. Gionis and Groteke¹⁴ applied spinal decompression therapy in 219 patients and reported that 86%

of the patients reported pain reductions. Gose et al.¹⁵ also concluded that spinal decompression therapy relieved pain and increased activity in patients with low back pain. In the current study, the EG achieved a larger decline in the VAS than the CG although both groups showed a statistically significant decline in pain. Previous research suggested that separation of the vertebral body in spinal decompression therapy reduced pressure within the disk and increased the diameter of the intervertebral foramen, resulting in the resolution of inflammatory exudations due to increased blood flow.¹⁶

In the current study, the EG achieved a larger decline in the ODI than the CG although both groups showed a statistically significant decline in disability. Kim et al.⁹ reported in their study that the patients treated with spinal decompression therapy showed an improvement from moderate to minimal disability. Likewise, the EG in the present study showed a positive change from moderate to minimal disability after spinal decompression therapy, whereas the CG experienced no change in the level of disability. This indicates that spinal decompression therapy is effective in enhancing functions. Previous research suggested that reduced pressure within the disk and subsequent pain reduction improved physical activities.¹⁷ The same study indicated that increasing the vertebral body height while taking care not to stimulate the annulus fibrosus fibers, which are sensitive to pain, restored the joints of the lumbar spine to their correct locations and improved physiological responses.^{17,18}

In this study, reductions in pain and the ODI may have been because repeated decompression targeting specific sites of the spinal disks, from which pain originated partially turned pressure within the disks into a gravity-free state. In addition, the normalization of the locations of disks may have relieved the patients' pain and helped enhance their functions. If weaknesses such as relatively expensive equipment and treatment costs and resetting and time delay due to a variety of variables that can arise during the treatment are compensated for in the future, spinal decompression therapy is likely to become an effective conservative therapy for pain reduction and functional enhancement.

The present study has a number of limitations. It included only a small number of patients. In addition, all the patients attended the hospital over a four-week period. Thus, their daily activities could not be fully controlled. In addition, there was no long-term follow-up of the treatment outcomes. Future studies may be required to

compensate for these limitations.

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