

# Rehabilitation Communications

DOI: doi.org/10.55627/rehab.004.01.1499

## Research Article

# Decompression Therapy Helps to Reduce Pain & Improve Function in Patients with Lumbar Disc Protrusion

Abdul Ghafoor Sajjad<sup>1</sup>, Muhammad Shahid Javed<sup>2</sup>, Aiman Alam<sup>3</sup>, Sameen Fatima<sup>4</sup>, Iqra Hamid<sup>5</sup>

<sup>1</sup>Islamabad Rehabilitation Sciences College, Islamabad, Pakistan

<sup>2</sup>Department of Physiology, Sargodha Medical College, University of Sargodha, Pakistan

<sup>3</sup>Aalaya Medical Center, Islamabad, Pakistan

<sup>4</sup>Riphah International University, Islamabad, Pakistan

<sup>5</sup>Max Physical Therapy and Rehabilitation Center, Max Health Hospital, Islamabad, Pakistan

\*Correspondence: abdul.ghafoor@imdcollge.edu.pk

© The Author(s) 2025. This article is licensed under a Creative Commons Attribution 4.0 International License. To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/>.

## Abstract

Traction or Decompression is an effective method used to rehabilitate patients with spinal disc protrusion. Decompression reduces the intra-disc pressure and provides space to allow the disc to remake itself. The objective of this investigation was to measure the effects of lumbar spine decompression therapy in patients with lumbar radiculopathy due to disc protrusion. A single-blind randomized controlled trial of 120 patients was conducted at Max Rehab & Physical Therapy Centre, Islamabad, Pakistan. All the patients were randomly allocated to a decompression group or a control group. Both groups received manual physical therapy treatment, including moist hot packs, soft tissue mobilization, manual spinal traction, lumbar spine mobilization, stretching and strengthening exercises, and a home plan. The only difference was that the decompression group received additional decompression therapy. The collected data included demographics and the numeric pain rating scale (NPRS) scores for the back pain, and the patient's functional levels through the modified Oswestry disability index. The data was collected before 1<sup>st</sup> visit and after 8<sup>th</sup> visit. We found that after the end of the 8<sup>th</sup> session of treatment, there was a significant difference in the baseline (pre) NPRS median interquartile range (IQR) value of the control group 3(1), and the decompression group 2(1), compared to their baseline (pre) values, with a p-value less than 0.001. The pre- (Modified Oswestry disability index (MODI) median (IQR) value of the control group was 43.5(7), and the decompression group was 28(9) with a p-value less than 0.001. We concluded that additional decompression therapy showed better results in managing patients' back pain and improving their functional level.

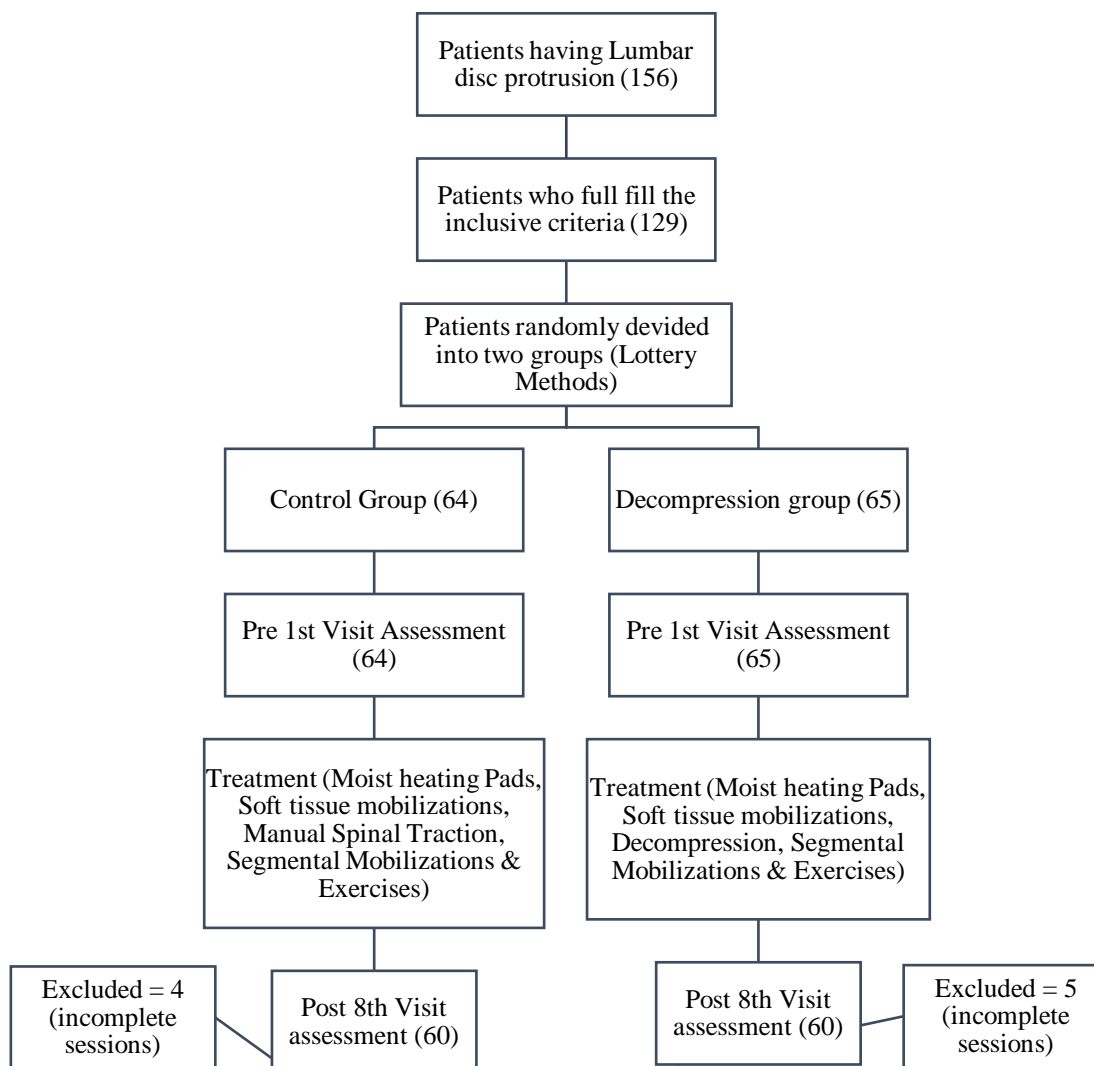
**Keywords:** Decompression, Disc Protrusion, Back Pain, Lumbar Radiculopathy

## 1. Introduction

The source of low back pain may be axial lumbosacral, radicular, and referred pain. The radicular pain radiates into the dermatome distribution, showing in which segment the nerve is compressed due to spondylosis or spinal disc protrusion (Urits et al., 2019) The nucleus pulposus contains proteoglycan that facilitates water retention, which maintains the hydrostatic pressure to bear the axial load of the spine. Due to pathomechanics issues, the disc loses its water content and becomes dehydrated.

The nucleus pulposus of the dehydrated disc shares the pressure with the annulus fibrosus, which protrudes and presses the spinal nerve (Benzakour et al., 2019). The L5-S1 segment has distinct biomechanical properties and is more prone to injury (Takegami et al., 2022).

Low back pain is the initial symptom of the lumbar disc herniation, and the lumbosacral region is the common site of the pain. This pain can radiate due to spinal disc compression on the unilateral or bilateral spinal nerves. This compression may be a single nerve compression



**Figure 1: Consort diagram of the study.**

or multiple compressions. Disc protrusion pain aggravating factors may include several postures, such as standing, sitting, driving, sneezing, and coughing (Cheng et al., 2021). The non-surgical treatment, such as medicine, acupuncture, massage, lumbar traction, and physical therapy, improves the symptoms up to 85% to 90% of lumbar disc protrusion cases (Lee et al., 2025). The exercises, especially stabilization exercises, improve the patient's pain and functional level. Multidisciplinary rehabilitation also helps patients reduce their symptoms. There is also sufficient evidence

about the use of manual therapy techniques such as spinal manipulation, mobilization, and soft tissue manipulation to decrease back pain. The most common among these modalities are heat and cold therapy, which benefit patients with low back pain (Hong et al., 2021). Traction or decompression is one of the more effective treatment methods used in the rehabilitation of patients with spinal disc protrusion. Decompression reduces the intra-disc pressure and provides space to allow the disc to remake itself (Koçak et al., 2017).

**Table 1: Demographic data of the participants**

S. No	Variables	Sub Variable	Control (%) N=60	Decompression (%) N=60	Overall (%) N=120
1.	Age	Age (Years)	42.28 ± 14.69	47.27 ± 11.61	44.78 ± 13.42
2.	Gender	Male	23	30	53
		Female	37	30	67
3.	Occupation	House Wife	50.0	36.7	43.3
		Office Worker	43.4	30	36.7
		others	5.6	33.4	20
4.	Onset of Pain	Less than 6 months	30.0	13.3	21.7
		Less than 12 months	10.0	26.7	18.3
		More than a year	60.0	60.0	60
5.	Unilateral involve leg	Right Leg	88.3	56.7	72.5
		Left Leg	11.7	43.3	27.5
6.	Dermatome	L3-L4	3.3	6.7	5
		L4-L5	28.3	20.0	24.2
		L5-S1	68.3	63.3	65.8

The purpose of this study was to compare the benefit of lumbar spine decompression therapy in patients with lumbar radiculopathy due to disc protrusion with the physical therapy conservative management. We also investigated the additional benefits of decompression therapy on the quality of life of the patients.

## 2. Methods & Materials

The ethics approval for this registered randomized controlled trial (RCT) was obtained through the letter number RIPHAH/RCRS/REC/Letter-00406 and was registered in the US Clinical Trial Registry (NCT04760210). The sample size for the study was 110 and calculated through 'open-Epi' tool with a 95% confidence level (CI) and 5% precision error (Varun, Jaspreet, and Naveen 2014). The patients were randomly assigned to two different groups through a random lottery method.

The duration of this study was from April 2020 to March 2022. The study was conducted at Max Decompression & Physical Therapy Center, Max Health Hospital Sector G-8, Islamabad, Pakistan. The Max Health Hospital is a private teaching

hospital of Riphah International University, Islamabad.

Initially, 156 patients were recruited for the study, of which only 129 fulfilled the inclusion criteria. We included patients of both genders, with a minimum age limit of 30 years (Tchounwou & Kuligowski, 2022), and maximum age limit was 60 years (Tarcău et al., 2022). Patients having complaints of localized and radiating pain of the lumbar spine, and those having lumbar disc bulging (confirmed through magnetic resonance imaging) were included. Patients with a history of lumbar disc surgery, lumbar spondylolisthesis, lumbar spine fractures, spinal stenosis, spinal tumors, ankylosing spondylitis, and those using anticoagulants were excluded.

All the participants were volunteers and had given written permission to be a part of this study. All the patients were divided into two groups, the control and decompression groups, through randomization. All the patients were treated for 8 sessions; the sessions were given on alternate days. Both groups received standard physical therapy treatment, including moist hot pack for 10 minutes on lumbar spine, Kaltenborn lumbar paraspinal soft tissue mobilization,

**Table 2: Wilcoxon Signed-Rank Test Inter-Group Analysis**

S. No	Variable	Groups	Before 1 <sup>st</sup> Visit Pre Median (IQR)	After 8 <sup>th</sup> Visit Post Median (IQR)	Mean Rank	P-Value
1.	Back Pain (NPRS)	Control	8(0)	3(1)	30.50	.001
		Decompression	8(2)	2(1)	30.50	.001
2.	Disability MODI	Control	75(16)	43.5(7)	30.50	.001
		Decompression	76(9.75)	28(9)	30.50	.001

Maitland manual lumbar spine traction, Maitland lumbar mobilization techniques including central posterior anterior mobilization, unilateral posterior anterior mobilization, and rotation mobilization, calf, hamstring and back extensors stretching exercises, and strengthening exercises included bridging, straight leg raise (SLR), prone hip extension, prone back extension (each technique was applied as 3 sets of 10 repetitions in each set). The stretching and strengthening exercises were also advised for home. The decompression group received the same treatment with additional decompression therapy. The data were collected on 1<sup>st</sup> visit before intervention and after 8<sup>th</sup> visit of therapy through a structured questionnaire. A CONSORT diagram representing the whole procedure is given in Figure I.

During the statistical analysis, it was found that the data were not normally distributed; therefore, we applied the Mann-Whitney test for inter-group analysis and the Wilcoxon Signed Rank Test for within-group analysis in SPSS version 21.

### 3. Results

The CONSORT diagram of the study is provided in Figure 1. The mean age of the participants was  $44.78 \pm 13.42$  years (Table 1). Among 120 participants, 53 were male and 67 were female. Around 43.3% were housewives and 36.7% were office workers. Most of the participants had pain for more than one year (60%), 21.7% had pain for

less than 06 months, and 18.3% had pain for less than 12 months. The percentage of radiculopathy due to prolapsed intervertebral disc (PIVD) in the right leg was 72.5, and in the left leg was 27.5. The highest dermatome level was L5-S1, which was 65.8%. (Table 1)

The Wilcoxon signed-rank test was applied for between-the-group analysis. In the control group, back pain improved and showed a significant difference between pre-1st visit and post-8th visit treatment. The pre median interquartile range (IQR) score of NPRS was 8(0) while the post median (IQR) was 3(1), with a p-value  $< .001$ . The patient's functional level also significantly improved with a pre median (IQR) score of MODI 75(16) and post median (IQR) score 43.5(7), and a p-value  $< .001$  (Table 2).

In the decompression group, back pain showed significant improvement, and a significant difference was observed between the pre-1st visit and post-8th visit treatment. The pre median (IQR) score of NPRS was 8(2) and post median (IQR) was 2(1), with a p-value  $< .001$ . The patient's functional level also improved and showed a significant difference with the pre median (IQR) score of MODI 76(9.75) and post median (IQR) of 28(9), with a p-value  $< .001$ .

The Mann-Whitney test was applied to group analyses. At the baseline, before the treatment of 1<sup>st</sup> visit, the difference was not significant. The pre back pain NPRS Median (IQR) value of the control group was 8(0), and the decompression group was 8(2) with a p-value of 0.288. The pre MODI median (IQR) value of the control group

**Table 3: Mann-Whitney U Test for Between-Group Analysis.**

S. No	Variable	Groups	Mean Rank	Median (IQR)	P-Value
1.	Before 1 <sup>st</sup> Visit Back Pain (NPRS)	Control	57.42	8(0)	.288
		Decompression	63.58	8(2)	
2.	After 8 <sup>th</sup> Visit Back Pain (NPRS)	Control	82.98	3(1)	.001
		Decompression	38.02	2(1)	
3.	Before 1 <sup>st</sup> Visit Disability MODI	Control	59.99	75(16)	.871
		Decompression	61.01	76(9.75)	
4.	After 8 <sup>th</sup> Visit Disability MODI	Control	90.50	43.5(7)	.001
		Decompression	30.50	28(9)	

NPRS (Numeric pain rating scale), MODI (Modified- Oswestry disability index), IQR (Interquartile range)

was 75(16), and the decompression group was 76(9.75) with a p-value of 0.871.

After the end of the 8<sup>th</sup> session of treatment, a significant difference was observed in both groups compared to the baseline values. The post-back pain NPRS Median (IQR) value of the control group was 3(1), and the decompression group was 2(1) with a p-value less than .001 compared with their pre-treatment values. The post-MODI median (IQR) value of the control group was 43.5(7), and the decompression group was 28(9) with a p-value less than .001 compared to their pre-treatment values. (Table 3)

#### 4. Discussion

The findings of our study show that there is a significant difference in decompression therapy for back pain compared to conventional physical therapy after 8 weeks of treatment. Our study also found that decompression therapy helps to improve the quality of life of patients. The age of patients with lumbar disc protrusion, also referred to as lumbar disc herniation, has been a topic of recent investigations. However, the age range in our study was in line with a previous study from South India involving 30 participants, with an average age of 41.73 years

(Ishtyaque et al., 2018). Another study, by Daltaban et al., on the radiological evaluation of lumbar disc herniation revealed that bulging, protrusion, and sequestration were more frequently observed in individuals aged 45 and above. This study reinforces the fact that lumbar disc protrusion frequently occurs in the age range of 40 to 50 years (Daltaban et al. 2019). Physical therapy treatments, including mobilization, exercises, and different modalities, help to reduce pain and improve the quality of life in patients with lumbar disc protrusion. Peng et al. found that therapeutic aquatic exercise and physical therapy modalities can relieve pain intensity and alleviate back disability for patients with low back pain (Peng et al., 2022). In a blind randomized clinical trial, Dohnert et al. found that lumbopelvic stabilization exercises and the McKenzie method were effective in reducing pain and enhancing function for patients suffering from low back pain caused by disc protrusion (Dohnert et al., 2020). In another study, Solum et al. demonstrated that physical therapy and core stabilization exercises have positive effects on pain, functional status, and quality of life in patients with failed back surgery syndrome,

which can be extrapolated to patients with lumbar disc protrusion (Solum, Altan, and Kasapoğlu Aksoy 2022). These findings are consistent with the results of our investigation. The mobilization technique used in the current study was Maitland mobilization. The evidence regarding the effectiveness of Maitland mobilization in addressing back pain and disability caused by lumbar disc protrusion is inconclusive. In their study, Plaza-Manzano et al. discovered that incorporating neurodynamic mobilization into a motor control exercise program resulted in decreased neuropathic symptoms and mechanical sensitivity among individuals with lumbar radiculopathy. However, they did not observe significant differences in pain levels or related disability (Plaza-Manzano et al., 2020). Another study, conducted by Ibrahim et al. found that Maitland lumbar mobilization can effectively enhance lumbar proprioception, reduce pain intensity, and improve functional disability in individuals suffering from chronic nonspecific low back pain. That study, however, does not specifically address how these findings can be directly applied to lumbar disc protrusion (Ibrahim et al., 2023). It is evident that physical therapy plays a significant role in improving back pain due to lumbar disc protrusion. Several studies have highlighted the effectiveness of various physical therapy modalities in managing this condition. For instance, a meta-analysis showed that the combination of mechanical traction and physical therapy had a positive impact on the clinical symptoms and function of lumbar disc herniation. This treatment approach was found to enhance the quality of life for patients (Wang et al., 2022).

Spinal decompression therapy is the advanced form of spinal traction; it is a fully computerized traction bed with a sensor in it. Spinal decompression therapy, when used alongside core stabilization exercises, has been extensively studied for its effectiveness in treating lumbar disc prolapse. In a single-blind randomized

controlled trial, Gaowgzeh et al. showcased the potential advantages of spinal decompression therapy and core stabilization exercises in effectively managing lumbar disc prolapse (Gaowgzeh et al., 2020). In a randomized controlled trial, Amjad et al. found that adding non-surgical spinal decompression therapy to routine physical therapy yielded better results than routine physical therapy alone. The combined therapy improved pain, range of motion, endurance, functional disability, and quality of life in patients with lumbar radiculopathy (Amjad et al., 2022). These findings indicate that the combination of decompression therapy and other interventions can be effective in enhancing the relief of back pain and reducing disability in patients with lumbar disc protrusion.

These studies offer valuable insights into the potential advantages of decompression therapy for enhancing the outcomes of patients with lumbar disc protrusion. This therapy shows promise in terms of pain management, functional disability, and overall quality of life. Based on the evidence from the selected references, it is clear that integrating decompression therapy with appropriate interventions shows potential in enhancing back pain and reducing disability in patients with lumbar disc protrusion.

## 5. Conclusion

It is concluded that additional decompression therapy showed better results in managing patients' back pain and improving functional levels as compared to standard manual therapy treatment of patients with radicular pain due to lumbar disc protrusion.

## Conflict of Interest

The authors declare that they have no conflicts of interest to disclose.

## Funding

There were no funding contributions for this research from any source.

## Study Approval

This study was approved by the Institutional Research Committee (IRC) – Riphah International University, Islamabad, Pakistan.

## Consent Forms

Every participant signed a consent form before participating in the research.

## Authors Contributions

Conceptualization and experimental work by AGS and MSJ; statistical analysis and interpretation by AA and SF, initial Draft by AGS and MSJ, review & editing by IH & AA.

## Data Availability

The authors have all the data.

## Acknowledgments

The authors thank Riphah International University, Islamabad, for helping in this project.

## References

- Amjad, F., Mohseni-Bandpei, M. A., Gilani, S. A., Ahmad, A., & Hanif, A. (2022). Effects of non-surgical decompression therapy in addition to routine physical therapy on pain, range of motion, endurance, functional disability and quality of life versus routine physical therapy alone in patients with lumbar radiculopathy; a randomized controlled trial. *BMC Musculoskeletal Disorders*, 23(1), 1–12. <https://doi.org/10.1186/S12891-022-05196-X/TABLES/2>
- Benzakour, T., Igoumenou, V., Mavrogenis, A. F., & Benzakour, A. (2019). Current concepts for lumbar disc herniation. *International Orthopaedics*, 43(4), 841–851. <https://doi.org/10.1007/S00264-018-4247-6/METRICS>
- Cheng, Z.-X., Zheng, Y.-J., Feng, Z.-Y., Fang, H.-W., Zhang, J.-Y., & Wang, X.-R. (2021). Chinese Association for the Study of Pain: Expert consensus on diagnosis and treatment for lumbar disc herniation. *World Journal of Clinical Cases*, 9(9), 2058–2067. <https://doi.org/10.12998/wjcc.v9.i9.2058>
- Daltaban İS, Çetintepe SP, Hakan A, Tutkun E. (2019). The Impact of Occupational Features On Radiological Staging of The Lumbar Disc Herniation. *Acıbadem Üniuersitesi Sağlık Bilimleri Dergisi*. 2019(3):524-8.
- Dohnert, M. B., Schwanck Borges, C., Steffen Evaldt, A., de Jesus Francisco, C., da Silva Dias, L., Chuaste Flores, B., Maciel Bello, G., Dimer da Luz, R., & Boff Daitx, R. (2020). Lumbopelvic stabilization exercises and mckenzie method in low back pain due to disc protrusion: A blind randomized clinical trial. *Muscles, Ligaments and Tendons Journal*, 10(4), 740–751. <https://doi.org/10.32098/MLTJ.04.2020.22>
- Gaowgzeh, R. A. M., Chevidikunnan, M. F., Binmulayh, E. A., & Khan, F. (2020). Effect of spinal decompression therapy and core stabilization exercises in management of lumbar disc prolapse: A single blind randomized controlled trial. *Journal of Back and Musculoskeletal Rehabilitation*, 33(2), 225–231. <https://doi.org/10.3233/BMR-171099>
- Hong, J. Y., Song, K. S., Cho, J. H., Lee, J. H., & Kim, N. H. (2021). An Updated Overview of Low Back Pain Management. *Asian Spine Journal*, 16(6), 968–982. <https://doi.org/10.31616/ASJ.2021.0371>
- Ibrahim, A. M., Elkeblawy, M. M., Howeidly, M. S., Elkeblawy, M. M., Grase, M. O., & Aneis, Y. M. (2023). Effect of Maitland mobilization on lumbar proprioception, pain, and disability in patients with chronic nonspecific low back pain. *Physiotherapy Quarterly*, 31(4), 87–92. <https://doi.org/10.5114/PQ.2023.125167>
- Ishtyaque, A., Aziz, A., & Muqtadeer, A. (2018). Functional outcome of microscopic lumbar discectomy for the treatment of lumbar disc prolapse. *International Journal of Research in Orthopaedics*, 4(3), 389–394.

<https://doi.org/10.18203/ISSN.2455-4510.INTJRESORTHOP20181438>

- Koçak, F. A., Tunç, H., Sütbeyaz, S. T., Akkuş, S., Köseoğlu, B. F., & Yılmaz, E. (2017). Comparison of the short-term effects of the conventional motorized traction with non-surgical spinal decompression performed with a DRX9000 device on pain, functionality, depression, and quality of life in patients with low back pain associated with lumbar disc herniation: A single-blind randomized-controlled trial. *Turkish Journal of Physical Medicine and Rehabilitation*, 64(1), 17. <https://doi.org/10.5606/TFTRD.2017.154>
- Lee, J. S., Lee, S. Bin, Kang, K. Y., Oh, S. H., & Chae, D. S. (2025). Review of Recent Treatment Strategies for Lumbar Disc Herniation (LDH) Focusing on Nonsurgical and Regenerative Therapies. *Journal of Clinical Medicine* 2025, Vol. 14, Page 1196, 14(4), 1196. <https://doi.org/10.3390/JCM14041196>
- Peng, M. S., Wang, R., Wang, Y. Z., Chen, C. C., Wang, J., Liu, X. C., Song, G., Guo, J. B., Chen, P. J., & Wang, X. Q. (2022). Efficacy of Therapeutic Aquatic Exercise vs Physical Therapy Modalities for Patients With Chronic Low Back Pain: A Randomized Clinical Trial. *JAMA Network Open*, 5(1), e2142069–e2142069. <https://doi.org/10.1001/JAMANETWORKOPEN.2021.42069>
- Plaza-Manzano, G., Cancela-Celleruelo, I., Fernández-De-Las-Penãs, C., Cleland, J. A., Arias-Buriá, J. L., Thoomes-De-Graaf, M., & Ortega-Santiago, R. (2020). Effects of Adding a Neurodynamic Mobilization to Motor Control Training in Patients with Lumbar Radiculopathy Due to Disc Herniation: A Randomized Clinical Trial. *American Journal of Physical Medicine and Rehabilitation*, 99(2), 124–132. <https://doi.org/10.1097/PHM.0000000000001295>
- SOLUM, Sezin, Lale ALTAN, and Meliha KASAPOĞLU AKSOY. (2022). The Effect of Physical Therapy and Core Stabilization Exercises in Failed Back Surgery Syndrome. *Journal of Physical Medicine & Rehabilitation Sciences*, 25(1)
- Takegami, N., Akeda, K., Yamada, J., Imanishi, T., Fujiwara, T., Kondo, T., Takegami, K., & Sudo, A. (2022). Incidence and Characteristics of Clinical L5–S1 Adjacent Segment Degeneration after L5 Floating Lumbar Fusion: A Multicenter Study. *Asian Spine Journal*, 17(1), 109–117. <https://doi.org/10.31616/ASJ.2021.0393>
- Tarcău, E., Ianc, D., Sirbu, E., Ciobanu, D., Boca, I. C., & Marcu, F. (2022). Effects of Complex Rehabilitation Program on Reducing Pain and Disability in Patients with Lumbar Disc Protrusion—Is Early Intervention the Best Recommendation? *Journal of Personalized Medicine*, 12(5), 741. <https://doi.org/10.3390/JPM12050741/S1>
- Tchounwou, B., & Kuligowski, T. (2022). Prevalence of Lumbar Segmental Instability in Young Individuals with the Different Types of Lumbar Disc Herniation—Preliminary Report. *International Journal of Environmental Research and Public Health* 2022, Vol. 19, Page 9378, 19(15), 9378. <https://doi.org/10.3390/IJERPH19159378>
- Urits, I., Burshtein, A., Sharma, M., Testa, L., Gold, P. A., Orhurhu, V., Viswanath, O., Jones, M. R., Sidransky, M. A., Spektor, B., & Kaye, A. D. (2019). Low Back Pain, a Comprehensive Review: Pathophysiology, Diagnosis, and Treatment. *Current Pain and Headache Reports*, 23(3), 1–10. <https://doi.org/10.1007/S11916-019-0757-1/FIGURES/1>
- Varun, Singh, Malik Manoj, Malik Jaspreet, and Ganer Naveen (2014). Comparison between posterior to anterior mobilization and traction SLR on pain and neurodynamic mobility in patients of low back pain. *Int J Physiotherapy and Research*, 2(1): 383-87.
- Wang, W., Long, F., Wu, X., Li, S., & Lin, J. (2022). Clinical Efficacy of Mechanical Traction as Physical Therapy for Lumbar Disc Herniation: A Meta-Analysis. *Computational and Mathematical Methods in Medicine*, 2022(1), 5670303. <https://doi.org/10.1155/2022/5670303>