

Effects of Lumbar Stabilization Exercise in Management of Pain and Restoration of Function in Patients with Postero Lateral Disc Herniation

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Abstract

Objective: Objective of this study was to assess the effectiveness of lumbar stabilization exercise in management of pain and restoration of function in patients with postero lateral disc herniation.

Methodology: In this randomized controlled trial 100 patients were taken. Using non-probability convenience sampling patients were divided into 2 groups, i.e. In Group A – patients were managed with lumbar stabilization exercises and in Group B patients were managed with conventional physical therapy. Final assessment was based on the following Oswestry scale.

Results: Mean age of patients in Group – A was 35.66 ± 6.34 years and in Group-B mean age was 37.96 ± 4.25 years. Before treatment total assessment score in Group – A and in Group – B was 16.13 ± 3.42 and 18.80 ± 3.06 . After treatment total assessment score in Group – A and in Group – B was 6.90 ± 2.68 and 13.53 ± 3.07 respectively. According to p-value significant difference was present in both groups. i.e.

(p-value = 0.000).

Conclusion: The Lumbar Stabilization exercises provide significantly better results compared with conventional physical therapy regimen in patients with disc herniation. Lumbar stabilization exercises were safe and easy to perform.

Keywords: Postero lateral disc herniation, lumbar stabilization, conventional physical therapy.

Introduction

Lumbar disk herniation (LDH) is a frequent source of low back pain. Risk factors for LDH include age, activity, smoking, obesity, vibration, sedentary lifestyle and psychosocial factors.¹ Nerve roots exit the spine below the intervertebral disks; thus, herniation of a disk involves the nerve root below it. The patient is observed for abnormal gait and abnormal posture. The patient's ability is tested to dorsiflex the foot while sitting to test the L₅ nerve root and for sensory loss that corresponds to a dermatomal area. Palpation of the lumbar spine and lower back is not helpful in the diagnosis of disk disease. A positive straight leg raising test is indicative of nerve root involvement. Nerve root stretch test results are often negative. Patients may exhibit decreased lumbar range of motion (ROM).^{2,3}

Previous Next Section: Causes

Laboratory tests generally are not helpful in the diagnosis of lumbar disk disease. Indications for screening

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laboratory examinations include pain of a non-mechanical nature, atypical pain pattern, persistent symptoms, and age older than 50 years.

Next Section: Emergency Department Care

The goals of therapy are to reduce pain and inflammation. These agents are used most commonly for the relief of mild to moderately severe pain. Treatment options include flurbiprofen, ketoprofen, and naproxen.³ In industrialized countries, approximately 50 – 80% of the adult population has low back pain at some time in their lives.^{4,5} Treatment of lumbar disc herniation is primarily conservative. The purpose is the relief from pain and inflammation, increased function, to enable early activity, to prevent recurrence, to inform the patient and enable him / her to turn back to life. In most of the researches on non-surgical treatments of lumbar disc herniation, efficacy of medical treatments, manipulation, epidural injections, nerve root blocks and several physical therapy modalities if compared the results of conventional physical are better than others.⁶⁻¹⁰

Rationale of this study is to compare the efficacy of lumbar stabilization exercises and conventional physical therapy in patients presented with problem of patients with disc herniation. In our set-up more and more conventional physical therapy is used to cure the disc herniation but upper lumbar stabilization exercise is found to be more effective in shorter duration of time in our common practice that's why I want to compare these two modalities to find out that which is better. If we achieve such results then in future without wasting time we will implement this procedure for the management of disc herniation.

Patients and Methods

Study Design: It was a randomized controlled trial.

Setting: Study was conducted at, Physiotherapy Department of Ittefaq Hospital Trust, Ferozpur Road, Lahore

Duration of Study: 6 months after approval of synopsis.

Sample Size: Sample size is 100 cases; 50 cases in each group is calculated with 95% confidence level, 6% margin of error and taking prevalence of lumbar disc herniation i.e. 10% in adult population.

Study Groups

Group – A: In this group patients were managed with lumbar stabilization exercises.

Group – B: In this group patients were managed with conventional physical therapy.

Sampling Techniques: Non-probability convince sampling technique was adopted to collect the data.

Sample Selection

Inclusion Criteria:

1. Patients of age 20 – 45 years of both genders.
2. Patients with established diagnosis of disc herniation.
3. Patients who have undergone surgery due to posterolateral herniation are also included in the study.

Exclusion Criteria:

1. Patients with history of traumatic lumbar disc prolapse.
2. Patients with medical record of spinal or bone malignancies.
3. Patients with history of osteoporosis or osteomalacia.
4. All other back pain patients with primary diagnosis other than disc involvement for example in ankylosing spondylitis, spinal stenosis, rheumatoid arthritis.
5. Hypermobility or hypomobility syndromes and of postural syndromes are not included in the study.

Methodology/ Data Collection Procedure: In this study 100 patients fulfilling inclusion and exclusion criteria, from Physiotherapy Department of Ittefaq Hospital Trust, Ferozpur Road, Lahore were taken. Their demographic profile (Name, Age, gender, Address and contact) was recorded. They were randomly divided into two groups (50 cases in each group) by using lottery method. In Group A patients were managed with lumbar stabilization exercises and in Group B patients were managed with conventional physical therapy. Experimental group received the LSE protocols whereas control group received conventional therapeutic exercises with their regular sessions of physical therapy. Final assessment was based on the following Oswestry scale.²¹

Oswestry Scale: The progress of the patients was measured on modified Oswestry scale. As this study is based on the subjective evaluation of the patients in their activities of daily life so modified Oswestry scale is the only instrument otherwise no else instruments has been used. The progress of all the patients was measured on a unified scale describing 5 disability variables, pain intensity, walking, standing, sleeping and social activity according to modified Oswestry Scale. Here is the format of the modified Oswestry Scale which was used in the study as an assessment tool modified by researcher (the detail is given in attached Performa).²¹

Data Analysis: SPSS version 17.0 was used to enter and analyze the data. Mean \pm SD was calculated for quantitative variable like age, height, weight, BMI. Frequency and percentages was calculated for qualitative variables like gender, and relief. Both groups were compared by using chi-square test. P-value \leq 0.05 was considered as significant.

Results

In this study the mean age of patients in Group – A was 35.66 ± 6.34 years and in Group-B mean age were 37.96 ± 4.25 years. There were 19 male and 41 female patients. In Group – A mean working hours was 8.23 ± 4.93 hours of patients and in Group – B mean working hours of the patients were 5.70 ± 2.07 hours, with higher mean working hours in group A.

Out of 60 patients 4 patients told that they feel moderate pain (Group – A = 4, Group – B = 0), 13 patients told they feel fairly sever pain (Group – A = 8, Group – B = 5), 33 patients told that they feel sever pain (Group – A = 15, Group – B = 18) and only 10 patients told that they feel pain which was worst imaginable (Group – A = 3, Group – B = 7). According to p-value pain intensity was independent of the treatment group of the patient before treatment. (p-value = 0.087). After treatment 2 patients reported no pain (Group – A = 2, Group – B = 0), 13 patients told they feel mild pain (Group – A = 11, Group – B = 2), 19 patients told that they feel moderate pain (Group – A = 14, Group – B = 5), only 23 patients told that they feel fairly sever pain (Group – A = 3, Group – B = 7) and only 3 patients told that they feel very severe pain (Group – A = 0, Group – B = 3). According to p-value pain intensity was dependent on the treatment given to the patient. (p-value = 0.000).

Lumbar stabilization exercises significantly improved the pain on walking of the patients as compare to the conventional methods, i.e. p-value = 0.000.

Before treatment 9 patients told that pain prevent them from standing for > 1 hour (Group – A = 6, Group – B = 3), 25 patients told that pain prevents them from standing more than 30 minutes (Group – A = 15, Group – B = 10), and only 3 patients told that pain prevents them from standing at all (Group – A = 1, Group – B = 2). After treatment, only 1 patients told that he can stand as long as he want without extra pain (Group – A = 1, Group-B=0), 18 patients told that they can stand as long as they want but it gives them extra pain (Group – A = 15, Group – B = 3), 23 patients told that pain prevents them from standing more than 1 hour (Group – A = 14, Group – B = 9), 14 patients told that pain prevents them from standing more than 30 minutes (Group – A = 0, Group – B = 14) and only 4 patients told that pain prevents them from standing for more than 10 minutes. (Group – A = 0, Group – B = 4). Standing of the patient was improved in both groups but it was statically significant in lumbar stabilization exercises group. i.e. (p-value = 0.000).

According to sleep disturbance only 2 patients told that their sleep was occasionally disturbed by pain (Group – A = 2, Group – B = 0), only 7 patients told that they were not able to sleep due to pain. (Group – A = 2, Group – B = 5). After treatment patients in both groups were asked about their sleep. Only 4 patients told that their sleep was never disturbed by pain (Group – A = 4, Group – B = 0), 16 patients told that because of pain their sleep was occasionally disturbed by pain (Group – A = 15, Group – B = 1), 20 patients told because of pain they had less than 6 hours sleep (Group – A = 9, Group – B = 11), 18 patients told that because of they were able to sleep less than 4 hour (Group – A = 2, Group – B = 16) and only 2 patients told that they had less than 2 hours sleep. (Group – A = 0, Group – B = 2). After treatment sleeping of the patients was significantly associated with the treatment groups. i.e. (p-value = 0.000).

According to their social activities, only 1 patient told that my social life is normal but increases the degree of pain (Group – A = 0, Group – B = 1), 3 patients told that pain has no significant effect on their social life apart from limiting their more energetic interests (Group – A = 3, Group – B = 0), 24 patients told that pain has restricted their social life and they did not go out as often (Group – A = 15, Group – B = 9) and 32 patients told that pain has restricted their social life to their home (Group – A = 12, Group – B = 20). Social

Table 1: Descriptive Statistics for Total Score (on Oswestry scale), before and after treatment.

	Before Treatment Score		After Treatment	
	Group – A	Group – B	Group – A	Group – B
Mean	16.13	18.80	6.90	13.53
Std. Deviation	3.42	3.06	2.68	3.07
Minimum	8.00	12.00	1.00	7.00
Maximum	24.00	23.00	12.00	19.00
p-value	0.002 (significant)		0.000 (significant)	

Group – A = Lumbar stabilization exercises
Group – B = Conventional physical therapy

activities before treatment were insignificantly associated with respect to treatment groups. i.e. (p-value = 0.058).

After treatment patients in both groups were asked about their social activities. Only 2 patient told that their social life is normal and gives me no extra pain (Group – A = 2, Group – B = 0), 19 patients told that their social life is normal but increases the degree of pain (Group – A = 18, Group – B = 1), 20 patients told that pain has no significant effect on their social life apart from limiting them from more energetic interests (Group – A = 9, Group – B = 11), 14 patients told pain had restricted their social life and they did not go out as often (Group – A = 1, Group – B = 13) and only 5 patients told that pain had restricted their social life to their home. (Group – A = 0, Group – B = 5). Social activities were significantly associated with respect to treatment groups after treatment. i.e. (p-value = 0.000).

Before treatment total assessment score in Group – A and in Group – B was 16.13 ± 3.42 and 18.80 ± 3.06 . According to p-value significant difference was present in both groups before treatment. i.e. (p-value = 0.002). After treatment total assessment score in Group – A and in Group – B was 6.90 ± 2.68 and 13.53 ± 3.07 respectively. According to p-value significant difference was present in both groups. i.e. (p-value = 0.000). In Group – A total assessment score after treatment was quite less as compared to Group – B.

Discussion

Lumbar stabilization exercises” (LSE) is a modern concept in the management of patients with posterolateral disc herniation. Certain muscles of the back support and stabilize the spine to help prevent low back pain (LBP). These muscles include the lumbar multifidi and the transversus abdominus. The lumbar “stabilization exercises” is a program of back muscles

exercises designed to improve strength and enhance flexibility in a pain-free range. It provides the patient with movement awareness, knowledge of safe postures, functional strength and coordination that promotes management of LBP.¹¹ Patients with herniation undergo regular physical therapy sessions including heat, ultrasound, manual therapy, postural care advice and therapeutic exercises. The conventional therapeutic exercises are either William’s flexion or Mackenzi’s extension. Majority of the back pain patients, especially due to herniation, have to suffer a lot due to their weak muscles of extensor compartment and peak intensity of pain in the following years.^{12,13}

LSE protocols specifically focus on lumbar spinal muscles that are actively engaged in exercise.^{14,15} These exercises relieve pain, improve functional parameters and strengthen trunk and back extensors.¹⁶ GSE are mainly flexibility exercises and study showed that benefits of these are not better. These old fashioned exercise do not have potential to actively engage lumbar spinal muscles so these are able to control spine in different postures. Except when patient is in acute condition, these exercises are perfectly safe, comfortable and easy to learn for all patients.

This finding was consistent with all participants in experimental group. Safety and efficacy of LSE has demonstrated in patient with low back pain including those with nerve root compression.¹⁷ These exercises do not have any contraindications and can readily be included in any therapeutic exercise program. However, at the end of the study, many patients fell bored when told to exercise. Although they took these exercises very lightly, nonetheless, their progress was satisfactory. This proves therapeutic efficacy and potential of stabilization exercises to activate the core stability effects. Besides therapeutic efficacy of LSE, it is also very mandatory for all working therapist to be fluent and accurate with their techniques in such patients, as these were found to provide excellent results.^{18,19} Re-

garding management of such patients, role of modalities and manipulative management needs to be clinically established.^{20,21}

The results of current study indicate that implementation of a protocol for lumbar stabilizing exercises can relieve pain and improve activities of daily living (ADL) performance in patients with disc herniation. It has been suggested that the stability of vertebral column components is a necessary factor for its normal functioning.²² It has also been confirmed the effective activity of muscles around the vertebrae may help to increase vertebral column stability by controlling the movement of adjacent vertebra.²³ Several studies have investigated the role of stabilizing exercises however, these have only confirmed the effectiveness of these exercises on pain relief and normal performance in patients with chronic low back pain, not herniated lumbar disc. In the presence of pathological conditions such as chronic low back pain or HLD, there are reports that lumbar stabilizer muscle function may be disturbed and that this upset the stability of adjacent vertebra.²⁴ Hodge and Richardson²⁵ showed that these muscles may not effectively provide lumbar stability during various movement in patients with low back pain. Kong and colleagues also described that muscle dysfunction destabilizes the spine and disturbs the functioning of other spinal components.²⁶ Although it has been shown that the stabilizing functions of intervertebral discs and muscles may be disturbed in patients with HLD, improving muscle function has received less attention in these patients, despite the fact that the malfunction of these stabilizing factors may cause increasing pain and reduce functional performance. Therefore, according to Punjabi's hypothesis lumbar vertebral stability is based not only on its structural shape, but also on the accurate performance of its surrounding neuromuscular system and it is logical and necessary to pay attention to lumbar stabilizing exercises when aiming to improve the performance of this system and establish stability in HLD patients. The result of current study shows that a LSE protocol improves the stability of the injured lumbar segment so that the patient's ability to fulfill the activities of daily living task performance is increased (walking, standing, sleeping, social activities) and they are able to perform tasks more easily and more comfortably.¹² Which demonstrated an improvement in functional ability of the post vertebral muscle followed by an increase in lumbar stability after instigation of an exercise protocol. Such changes in patients performance may be related to changes in several factors including lumbar

muscle structure, passive structure and proprioceptive function.

Several studies have investigated the effect of exerciser therapy on the size and type of muscle fiber in muscle stabilizing the lumbar region, although most of these studies have been performed in chronic low back pain patients. Hide and colleagues found that a four week exercise program may increase the size of multifidus muscle.²⁷ The LSE protocol may strengthen stabilizer muscle and increase their efficiency to stabilize components of the lumbar vertebral column, improving task performance in HLD patients as a consequence. This may help patients perform their activities of daily living with improved ease and comfort.

Conclusion

The Lumbar Stabilization exercises provide significantly better results compared with conventional physical therapy regimen in patients with disc herniation. Lumbar stabilization exercises were safe and easy to perform. This clinical trial shows that a lumbar stabilizing exercise protocol may increase lumbar stability and improve activities of daily living performance in patients who have suffered with a herniated lumbar disc. It may also be concluded that these types of exercises may strengthen the stabilizer muscle, which control and limit the free movement of one vertebra on another. From the results obtained by the current study it may also deduced that the increased stability of adjacent vertebra in the vertebral column may accelerate the recovery process of the herniated disc. The results of this study may encourage physiotherapists to use LSE to treat patients with lumbar herniated disc as compared to the conventional physical therapy.

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