Original Article

Effect of Therapeutic Exercises and Activities of Daily Living Instructions among PLID Patients in a Specialized Hospital: A Randomized Control Trial

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Abstract

Introduction: Prolapsed lumbar intervertebral disc (PLID) is a major cause of low back pain (LBP). More often these patients take pain killers to reduce the pain. However, exercise and life style modifications can effectively reduce pains in these patients. **Methodology:** We did a randomized control trial (RCT) between the periods of January 2022 to June 2022 in the Department of Physical Medicine & Rehabilitation of Shaheed Sheikh Abu Naser Specialized Hospital, Khulna, Bangladesh. We enrolled 70 patients maintaining inclusion and exclusion criteria who were presented with back pain due to PLID in the age group of 20 to 55 years of both sexes. We divided the patients into 2 groups (group A with 35 patients who were advised therapeutic exercise and activities of daily living (ADL) instructions and group B with 35 patients without therapeutic exercise and ADL instructions). Pain reduction was assessed by Visual Analogue Scale (VAS) and Straight Leg Raising (SLR) test. **Results:** After receiving 6 weeks of therapeutic exercises and ADL instructions group A patients had significant pain reduction with mean VAS 1.03 compared to group B who had VAS 1.63 (*p* 0.009). SLR test also revealed significant pain reduction after receiving 6 weeks therapeutic exercises and ADL instructions (*p* 01007 and 0.019). **Conclusion:** Therapeutic exercises and activities of daily living instructions reduce pain among patients with PLID.

Keywords: Therapeutic Exercises, Activities of Daily Living (ADL) Instructions, Prolapsed Lumbar Intervertebral Disc (PLID).

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Background

Low back pain with or without sciatica is a major cause of morbidity throughout the world. The life time incidence is 50-70% and the incidence of sciatica may be as high as 40%. However clinically significant sciatica due to disc prolapse occurs in 4-6% of the population. The degeneration of intervertebral disc from a combination of factors can result in herniation, particularly at the L4-L5 and L5-S1 levels in more than 90% of the cases. The L3-L4 and L2-L3 accounts for the majority of remaining herniations. Neuro-imaging can differentiate herniated lumbar disc prolapse from other causes of low back pain and sciatica [1].

Defining LBP is difficult, but refers to a symptoms complex in which pain is localized to the lumbar spine or referred to the leg or foot [2].

Pain that radiates from the lower back down to one or other leg is known as sciatica. It is often exacerbated by exertion, coughing, sneezing, or straining. One of its most common causes is a 'slipped disc' which exerts pressure on one of the roots of the sciatic nerve [3].

Lumbar disc herniation is a pathological condition in which a tear in the outer, fibrous ring (annulus fibrosus) of an intervertebral disc allows the soft, central portion (nucleus pulposus) to be extruded (herniated) to the outside of the disc [4]. Displaced disc material can be initially classified as a bulge (disc material is displaced >50% of its circumference) or as a herniation (<50% of its circumference). Disc herniations can then be sub classified into protrusions or extrusions. A disc protrusion is defined as a herniation with the distance of the edges of the herniated material less than the distance of the edges at its base. A disc extrusion occurs when the distance of the edges of the herniated material is greater than the distance of the edges at its base. A disc extrusion can be further sub classified as sequestrated if the extruded disc material has no continuity with the disc of origin [5].

Acute disc prolapse may occur at any age, but is uncommon among very young and very old. Typically, while lifting or stooping, one feels severe back pain and is unable to straighten up. Either then or a day or two later pain is felt in the buttock and lower limb (sciatica) [6]. Diseases affecting the upper lumbar spine tend to refer pain to the lumbar region, groin or anterior thighs. The pain may worsen in postures that stretch the nerves and nerve roots. Sitting stretches the sciatic nerve (L5 and S1 roots) because the nerve passes posterior to the hip [7].

There are various options for treatment of chronic low back pain. Of them pharmacotherapy, thermotherapy & exercise therapy are commonly used. Exercise therapy remains one of the conservative mainstays of treatment for chronic low back pain and may be tailored to include aerobic exercise, muscle strengthening and stretching exercises [8]. Significant variations in regimen, intensity and frequency of prescribed programs present challenges to assessing efficacy of treatment among patients [9]. One meta-analysis of the current literatures exploring the role of exercise therapy in patient with varying duration of symptoms found a graded exercise program implemented within the occupational setting demonstrated some effectiveness in sub-acute low back pain. Among those suffering from chronic low back pain symptoms, small, but statistically significant improvements were observed regarding pain reduction and functional improvement [10].

Bangladesh is a poor country with huge population & very limited resources. So, it is quite difficult to manage such a huge number of PLID patients with our existing resources and management systems. As diagnostic approach and therapeutic options are diverse and often inconsistent, the management of PLID costs more recovery throughout the country. The present study was conducted to evaluate the effects of back muscle strengthening exercises on the patients of PLID to make the treatment easy & cost effective and to make disabled patients into working ones.

Methodology

We did a randomized control trial (RCT) between the periods of 1st of January 2022 to 30th June 2022 in the Department of Physical Medicine & Rehabilitation of Shaheed Sheikh Abu Naser Specialized Hospital, Khulna, Bangladesh. We enrolled 70 patients maintaining inclusion and exclusion criteria who were presented with back pain due to PLID in an age group of 20 to 55 years of both sexes. We divided the patients into 2 groups (group A with 35 patients who were advised therapeutic exercis-

es and activities of daily living (ADL) instructions and group B with 35 patients without therapeutic exercises and ADL instructions). Pain reduction was assessed by Visual Analogue Scale (VAS) and Straight Leg Raising (SLR) test.

Inclusion criteria

- Unilateral leg pain worse than low back pain
- Pain radiates beyond knee
- Paraesthesia in same distribution
- Nerve irritation signs (reduced straight leg raising that reproduces leg pain)
- Motor, sensory or reflex signs (limited to one nerve root).

Exclusion criteria

- Painful spinal deformity
- Severe/symmetrical spinal deformity
- Cauda equina syndrome
- Progressive neurological signs/muscle-wasting
- Multiple levels of root signs
- Previous spinal surgery, scoliosis, spinal cord disease, tuberculosis, tumor.

Patients were divided into two groups by simple random sampling by lottery. Equal numbers of patients were enrolled in both study group (Group A) and control group (Group B). Ethical clearance was taken from appropriate authority.

Interventions

Use of analgesics, therapeutic exercises and instruction of ADLs during treatment.

NSAID: Tab. Naproxen (500mg) twice daily after meal for pain relief with Cap. Omeprazole (20mg) coverage for first 3 days, then SOS.

Exercises: Back muscle strengthening exercises was demonstrated to every patient and was advised to do ten repetitions twice daily.

ADL instructions: ADL instructions was given to protect the Back from pain in all groups.

Data was collected using a preformed data collection sheet from all patients of group A and group B in a predesigned questionnaire from the first visit. Follow up data were collected from each patient in every 3 weeks interval from the first visit for up to 6 weeks. All data were compiled, screened and checked for any missing values and discrepancy. All omissions and inconsistencies were corrected and were removed methodically. Statistical analysis was done by SPSS. A p value <0.05 was considered significant.

Prior to the commencement of this study, the aims and objectives of the study along with its procedure, methods, risks and benefits of this study were explained to each respondent in easily understandable language and informed consent was taken. It was assured that all records would be kept confidential.

Results

A total number of 70 PLID patients were recruited for this study of which 35 patients were in study group (group A) and the rest 35 patients were in the control group (group B).

Discussion

A total number of 70 PLID patients were recruited for this study of which 35 patients were in study group (group A) who were treated with therapeutic exercises and ADL instructions and the rest 35 patients were in the control group (group B) who were treated without therapeutic exercises and ADL instructions.

The distribution of patients according to gender is recorded. In group A male was predominant than female which was 25 (71.4%) cases and 10 (28.6%) cases respectively. In group B male was also predominant than female which was 28 (80.0%) cases and 7 (20.0%) cases respectively. The difference between these two groups was not statistically significant ($p= 0.403$). It has been found that

Table I. Distribution of study population according to socio-demographic factors (n=70).

Socio-demographic Factors		Group A n (%)	Group B n (%)	Total n (%)
Occupation	House wife	10 (28.6)	7 (20)	17 (24.3)
	Service holder	5 (14.3)	5 (14.3)	10 (14.3)
	Businessman	5 (14.3)	6 (17.1)	11 (15.7)
	Farmer	10 (28.6)	11 (31.5)	21 (30)
	Day laborer	5 (14.2)	6 (17.1)	11 (15.7)
Socio-economic Status	Poor	21 (60)	24 (68.6)	45 (64.3)
	Middle class	13 (37.1)	9 (25.7)	22 (31.4)
	Rich	1 (2.9)	2 (5.7)	3 (4.3)

Table I shows distribution of patients by socio-economic condition. Most of the patients were from poor in both groups which were 21 (60%) cases and 24 (68.6%) cases in group A and group B respectively; this was followed by middle class which were 13 (37.1%) cases and 9 (25.7%) cases respectively. Only few patients were rich in both groups. In group A most of the patients were housewife (28.6%) and farmer (28.6%), followed by service holder (14.3%), businessman (14.3%) and day labourer (14.2%). In group B most of the patients were farmer (31.5%) followed by housewife (20.0%), businessman (17.1%), day labourer (17.1%) and service holder (14.3%).

Table II. Outcome of the patients according to Visual Analogue Scale after receiving therapeutic exercises (with t - test significance).

Study groups	N	Mean±SD	Median	Range	Significance*
Group A	35	7.20±0.9	7	6–9	t = 0.422
Group B	35	7.11±0.8	7	6–9	P = 0.675
Total	70	7.16±0.84	7	6–9	NS
Group A	35	2.94±1.11	3	1–5	t = 0.123
Group B	35	2.91±0.82	3	2–5	P = 0.903
Total	70	2.93±0.97	3	1–5	NS
Group A	35	1.03±0.92	1	0–3	t = 2.691
Group B	35	1.63±0.94	2	0–3	P = 0.009
Total	70	1.33±0.97	1	0–3	**HS**

* Independent samples t - test.

NS = Not Significant (P > 0.05); HS = Highly Significant (P < 0.01)

Table 2 shows outcome of patient assessed by visual analogue scale (VAS) after receiving therapeutic exercises. The mean score of VAS before treatment were 7.20 ± 0.90 and 7.11± 0.80 in group A and group B respectively (p=0.675). The mean score of VAS in 3 weeks after treatment were 2.94 ± 1.11 and 2.91 ± 0.82 in group A and group B respectively (p=0.903). The mean score of VAS in 6 weeks after treatment were 1.03 ± 0.92 and 1.63 ± 0.94 in group A and group B respectively. The difference of VAS between these two groups were statistically significant (p=0.009).

Table III. Outcome of the patients according to straight leg raising (SLR) test scores among the study groups (with t - test significance).

	Study groups	N	Mean±SD	Median	Range	Significance*
SLR–Right (Week 0)	Group A	35	69.57±18.76	70	30–90	t = 0.340
	Group B	35	68.00±18.76	70	25–90	P = 0.735
	Total	70	68.79±18.76	70	25–90	NS
SLR–Left (Week 0)	Group A	35	68.86±18.76	80	20–90	t = 0.349
	Group B	35	67.14±18.76	70	30–90	P = 0.728
	Total	70	68.00±18.76	70	20–90	NS
SLR–Right (Week 3)	Group A	35	80.57±18.76	85	100–270	t = 1.127
	Group B	35	77.43±18.76	75	110–150	P = 0.264
	Total	70	79.00±18.76	80	100–270	NS
SLR–Left (Week 3)	Group A	35	78.14±18.76	80	45–90	t = 0.322
	Group B	35	77.14±18.76	80	40–90	P = 0.748
	Total	70	77.64±18.76	80	40–90	NS
SLR–Right (Week 6)	Group A	35	86.57±18.76	90	75–90	t = 2.779
	Group B	35	81.71±18.76	80	60–90	P = 0.007
	Total	70	84.14±18.76	90	60–90	**HS**
SLR–Left (Week 6)	Group A	35	86.00±18.76	90	75–90	t = 2.408
	Group B	35	82.14±18.76	85	65–90	P = 0.019
	Total	70	84.07±18.76	85	65–90	**S**

* Independent samples t - test.

NS = Not Significant (P > 0.05); HS = Highly Significant (P < 0.01)

Table 3 shows outcome of patient assessed by Straight leg raising (SLR) test. The mean score of SLR test (right side) before treatment were 69.57 ± 18.76 and 68.00 ± 19.86 (p=0.735) in group A and group B respectively. The mean score of SLR test (left side) before treatment were 68.86 ± 21.83 and 67.14 ± 19.22 (p=0.728) in group A and group B respectively. The mean score of SLR test (right side) after treatment of 3 weeks were 80.57 ± 11.10 and 77.43 ± 12.21 (p=0.264). The mean score of SLR test (left side) after treatment of 3 weeks were 78.14 ± 13.34 and 77.14 ± 12.62 (p=0.748) in group A and group B respectively. The mean score of SLR test (right side) after treatment of 6 weeks were 86.57 ± 5.39 and 81.71. ± 8.82 (p=0.007) in group A and group B respectively. The mean score of SLR test (left side) after treatment of 6 weeks were 86.00 ± 5.12 and 82.14 ± 7.98 (p=0.019) in group A and group B respectively.

male is more commonly affected by PLID. This may be due to the heavy works done by them. Similar to the present result Akbar A (2002) have reported that male is predominant in PLID group [1]. Asghar Ali et al. (2013) also showed the similar result [4]. This may be because males are predominantly involved in laborious activities and strenuous exercises.

The distribution of patients according to occupation is recorded. In group A most of the patients were housewife (28.6%) and farmer (28.6%), followed by service holder (14.3%), businessman (14.3%) and day laborer (14.2%). In group B most of the patients were farmer (31.5%) followed by housewife (20.0%), businessman (17.1%), day laborer (17.1%) and service holder (14.3%). It has been found that housewives are most vulnerable in disc

prolapse in group A; however, farmers are more in group B. The disc prolapse is directly related with the occupation. The excess work load causes the PLID. Similar to this present study Kelsey et al. (1984) have reported that occupation is directly related with the PLID and also have added that the occupation which is related with weight lifting is more associated with PLID [11]. Similarly, Seidler et al. (2003) have published a report regarding the pattern of occupation and the occurrence of PLID which is consistent with the present study [12].

The outcome of patient assessed by visual analogue scale (VAS) was recorded. The mean score of VAS before treatment were 7.20±0.90 and 7.11±0.80 in group A and group B respectively (p=0.675). The mean score of VAS in 3 weeks after treatment were 2.94±1.11 and 2.91±0.82 in group A and group B respectively (p=0.903). The mean score of VAS in 6 weeks after treatment were 1.03±0.92 and 1.63±0.94 in group A and group B respectively (p=0.009). The improvement rate was better in group A than group B. The difference between two groups in improvement was statistically significant after 3 weeks and onward. Nilay S et al. (2011) study the decrease in VAS values pre- and post-treatment was statistically significant in both study groups (VAS: 95% CI = 4.685.15; 5.125.58, for BSG-CG, respectively) [13]. These results were statistically significant ($p < 0.01$). Global improvement and VAS pain scores were also better in patients who continued with exercise than in those who did not, but this difference was not statistically significant ($P>0.05$). Rahman MM et al. (2012) found that there is decrease in VAS score in patients treated with back muscle strengthening exercise which were statistically significant ($p < 0.001$) [14].

The outcome of patient assessed by straight leg raising test was recorded. The mean score of Straight leg raising test (right) before treatment were 69.57± 18.76 and 68.00±19.86 (p=0.735). In left side before treatment were 68.86± 21.83 and 67.14± 19.22 in group A and group B respectively (p=0.728). The mean score of Straight leg raising test (right) 3 weeks after treatment were 80.57± 11.10 and 77.43± 12.21 (p=0.264). In left side 3 weeks after treatment were 78.14± 13.34 and 77.14± 12.62 in group A and group B respectively (p=0.748). The mean score of straight leg raising test (right) 6 weeks after treatment were 86.57± 5.39 and 81.71± 8.82 (p=0.007). In left side 6 weeks after treatment were 86.00± 5.12 and 82.14± 7.98 in group A and group B respectively (p=0.019) in both groups trend of improvement was positive. The improvement rate was better in group A than group B. The difference between two groups regarding improvement was statistically significant after 6 weeks. In both groups trend of improvement was positive. The improvement rate was better in group A than group B. Amir Hosing et al. (2005) 90 have been reported similar result and have mentioned that back exercise with activity of daily living have decreased the pain intensity of PLID and improved SLR [15].

Conclusion

From the above study it could be concluded that, therapeutic exercises and activities of daily living reduce the pain in patients with PLID by reduction of VAS score and increment of straight leg raising test score.

Limitations

Although the results of this study support the hypothesis, there are some facts to be considered which might affect results.

- Because of time limitation and financial constraints, the study was conducted with small sample size. So, it may not be adequate to represent the whole population.
- Short time follow up.

• This is a single centered study.

Recommendations

• Further study is needed from primary to tertiary level hospitals in Bangladesh for better understanding to evaluate the efficacy of Therapeutic exercises in PLID patients.

• Therapeutic exercises and activities of daily living instructions should be given to the patients with PLID patients.

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