ORIGINAL ARTICLE

Comparison of positional distraction with stabilisation exercises versus stabilisation exercises alone in the management of lumbar radiculopathy: A randomized controlled-trial

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Abstract

Objective: To compare the effects of positional distraction with stabilisation exercises versus stabilisation exercises alone in the management of lumbar radiculopathy.

Method: The randomised controlled trial was conducted from July to December 2020 at the Institute of Physical Medicine and Rehabilitation, Dow University of Health Sciences, and the Neurosurgery ward of Civil Hospital, Karachi, and comprised individuals of either gender with lumbar radiculopathy pain who were randomised into positional distraction with stabilisation exercises group A and stabilisation exercise group B. The treatment duration was 3 sessions per week for 8 weeks. Intensity of pain and disability were assessed using the Visual Analogue Scale and the Roland Morris Disability Questionnaire, respectively. Data was analysed using SPSS 21.

Results: Of the 100 patients, 63(63%) were males and 37(37%) were females. Overall, 89(89%) were married. There were 50(50%) subjects in group A with mean age 39.42±6.36 years and 50(%) in group B with mean age 38.80±6.69 years. There was no significant difference in terms of age, gender and marital status between the groups (p>0.05). The study was completed by 96(96%) patients; 48(50%) in each of the 2 groups. Intragroup improvement post-intervention compared to baseline was significant (p<0.001) in both groups. Outcomes in group A were significantly better than in group B (p<0.05).

Conclusion: Addition of positional distraction to stabilisation exercises was found to have superior effects compared to stabilisation exercise alone on pain and functional disability among patients with lumbar radiculopathy.

Clinical Trial Number: NCT04427423 dated 27th April 2020.

Keywords: Low back pain, Exercise therapy, Radiculopathy, Sciatica, Traction. (JPMA 73: 5; 2023)

DOI: https://doi.org/10.47391/JPMA.6540

Introduction

Low back pain (LBP) is a major health problem because it results in work-related absences, and lower the quality of life.[1] Chronic LBP due to disc bulging is common, disabling and long-lasting condition which causes socioeconomic burden on society.[2] LBP with or without sciatica has been found to be very common in Pakistan, affecting 84% people once in their lifetime and 86% of LBP with sciatica patients have disc bulging at L4- L5 and L5- SI.[3] The Lumbosacral Radicular Syndrome (LRS), or sciatica, is a symptom of nerve root involvement with radiating pain in the leg below the knee.[4] The most common cause of sciatica is lumbar disc herniation, and is defined as localised displacement of disc material beyond the margins of the intervertebral disc space, which produces pressure on the nerve root with patients reporting back and leg pain.[5] The incidence of sciatica was high in obese patients due to increased axial load on the spine. It is reported that high body mass index (BMI) is significantly associated with sciatica.[6] Several biomechanical studies proved that the combination of an axial load and flexion or an axial load and twisting mechanism can lead to lumbar disc herniation.[7] The commonest cause of years lived with disability (YLDs) is LBP.[8] Sciatica is common between in those aged 30-77 years, and is more common in males (57%) compared to females (43%).[9] The global burden of disability caused by LBP was found to be around 27% and it was directly related to ergonomic and occupational risks. This is common in labour, industries and the people who lift heavy weights.[10] The risk factors associated with sciatica included male gender, smoking, obesity, previous history of LBP, depression, anxiety and a job requiring prolonged standing and forward bending, heavy weightlifting, manual labour, professional drivers and exposure to vibrations.[11]

In clinical practice, non-pharmacological treatments for sciatica include electrotherapy, home exercises with counselling and education, manipulation, lumbar traction,

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Submission complete: 05-01-2023 **Review began:** 18-02-2023

Acceptance: 23-09-2023 **Review end:** 28-08-2023

stabilisation, strengthening, flexibility and McKenzie exercises.[12]

Sciatica may respond positively to traction and stabilisation exercises. Positional distraction (PD) is an alternative form of manual traction which is performed in clinics for the treatment of sciatica. PD allows frequent unloading of the affected nerve root, that it can decompress the spinal level to maximally open the affected neuroforamen. This position is maintained by the patients for a few minutes.[13]

Some studies have shown that exercises and traction together were more effective in LBP and sciatica compared to exercises alone. In contrast, some studies have shown no significant difference between the two approaches in the management of sciatica.[14]

Several studies have been conducted in Pakistan on LBP[11,15,16] but, to our knowledge, no study has explored the effects of PD on sciatica. The current study was planned to fill the gap in literature by comparing the effects of PD with stabilisation exercises versus stabilisation exercises alone in the management of lumbar radiculopathy.

Patients and Methods

The single-blind randomised controlled trial (RCT) was conducted from July to December 2020 at the Department of Physical Therapy, Institute of Physical Medicine and Rehabilitation, Dow University of Health Sciences (DUHS), and the Neurosurgery Outpatient Department (OPD) of Civil Hospital, Karachi (CHK). After approval from the DUHS ethics review board, the trial was prospectively registered with clinical trial number NCT 04427423 dated 27th April 2020. The sample size was estimated using OpenEpi 3.01[17] with mean Visual Analogue Scale (VAS) score 12.3±13.7 for stabilisation plus general exercises and 21.3±17.3 for general exercises alone with 5% dropout rate.[18] The subjects were recruited using non-probability purposive sampling technique.

Those included were radiculopathy patients of either gender aged 30-50 years having disc bulge at L4- L5 or L5-S1 on magnetic resonance imaging (MRI) and not having lumbar disc bulge at >2 adjacent levels, with pain history of > 12 weeks but <1 year. Those excluded were patients with tumour and infection in the spine, spondylolisthesis at L4-L5 or L5-S1, fracture of the lumbar spine, sciatica of other than lumbar region (piriformis syndrome), acute cardiopulmonary conditions, or morbid obesity with BMI >30.

After taking written informed consent from the participants, demographic characteristics were noted using a proforma. The participants were then randomised using fixed concealed allocated randomisation method into group A treated with PD and stabilisation exercises, and group 2 treated with stabilisation exercises alone. Both groups received 3 sessions per week for 8 weeks for a total of 24 sessions. The sessions were conducted by the principal investigator after providing verbal information to the subjects on the importance of proper posture, and advice on sitting, standing, walking, lifting and home exercises. During each session, the participants in each group received stabilisation exercises, which was followed by PD to group A.

In PD, the spinal level of vertebral level requiring traction was palpated, a soft roll was placed and the patients were asked to side-lie on the unaffected side (Figure 1). For further distraction, both hips were flexed until movement was noted at the spinal level needing traction. Further distraction was applied by rotating the upper trunk to the opposite side of pain. This position was maintained for 15 minutes. The patients were asked to perform PD at home 2-3 times per day after proper training. All patients underwent 3 stages of stabilisation exercises programme progression; stage 1 for the first 3 weeks, stage 2 for the next 3 weeks, and stage 3 was performed by the patients for the last 2 weeks.

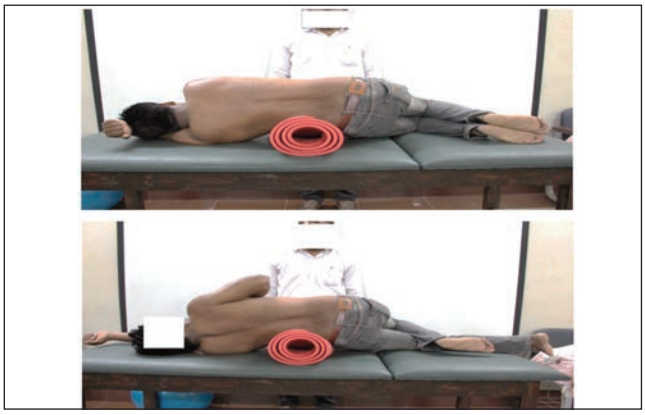

Figure-1: Positional distraction in the experimental group.

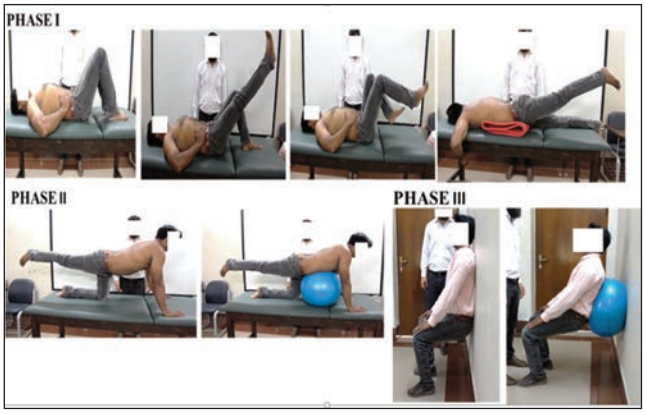

Figure-2: Stabilisation exercises to experimental and control groups.

In the first phase, the patients were instructed to contract the abdominals towards the bed in crook lying and to hold this position for 10 seconds. The exercise was repeated 10 times with 3 repetitions. Then the patients in supine position did straight leg raise alternatively with abdominal tuck-in, holding each lower limb for 5 seconds and repeating this 10 times. In the third step, the patients were instructed to adopt hook lying position and perform marching motion 10 times. Counselling of the patients was done to carry out this activity at home at least 2 times a day. In the last exercise of phase 1, patients lay prone over a pillow, and extended the lower limb alternatively while holding each lower limb in extension for 5 seconds with 10 repetitions (Figure 2).

In the second phase, the patients were in all-four position and were instructed to extend each lower limb alternatively and the lifted leg was held for 10 seconds with 10 repetitions. Once the patients had mastered the position, they were asked to perform the same exercise over a physio-ball for further stability.

In the third phase, the patients performed wall slide squat with 10-second hold for 10 repetitions. Once the patients had mastered the position, they were asked to perform the same exercise with the physio-ball.

All the patients in both groups were assessed at baseline and at the end of the intervention. VAS 0-10cm[19] for pain, and Roland Morris Disability Questionnaire (RMDQ 0-24) for disability were used.[20]

Data was analysed using SPSS 21. The data was not normally distributed, and, therefore, non-parametric Mann-Whitney-U test and Wilcoxon paired test were used, as appropriate. P<0.05 was considered significant.

Results

Of the 180 patients assessed, 100(55.5%) were included; 63(63%) males and 37(37%) females. Overall, 89(89%) were married. There were 50(50%) subjects in group A with mean age 39.42±6.36 years and 50(%) in group B with mean age 38.80±6.69 years. There was no significant difference in terms of age, gender and marital status between the groups (p>0.05) (Table 1). The study was completed by 96(96%) patients; 48(50%) in each of the 2 groups (Figure 3).

Table-1: Baseline inter-group comparison.

Groups	Control	Experimental Group	Independent sample t-test	
Characteristics	**Mean±SD**	**Mean ±SD**	**Statistic**	***p*-value**
Age (years)	38.80±6.69	39.42±6.36	-0.475	0.636
				Chi square test
Characteristics	**n (%)**	**n (%)**	**Statistic**	***p*-value**
Gender			0.386	0.534
Male	33 (52.4)	30 (47.6)		
Female	17 (45.9)	20 (54.1)		
Marital Status			0.102	0.749
Single	5 (45.5)	6 (54.5)		
Married	45 (50.6)	44 (49.4)		

SD: Standard deviation.

Table-2: Comparison of inter-group mean VAS and RMDQ values.

Groups Scores	Control Mean±SD	Experimental Mean±SD	p-value
Pre VAS	5.62±0.98	5.92±0.98	0.117*
Post VAS	3.39±0.76	2.72±0.96	<0.001*
p-value	<0.001**	<0.001**	
Pre RMDQ	11.88±2.12	12.00±2.66	0.958*
Post RMDQ	8.47±1.73	6.93±2.54	<0.001*
p-value	<0.001**	<0.001**	

SD: Standard deviation, VAS: Visual analogue scale, RMDQ: Roland Morris disability questionnaire: * *p*-value obtained from Mann-Whitney-U test; ** *p*-value obtained from Wilcoxon paired test

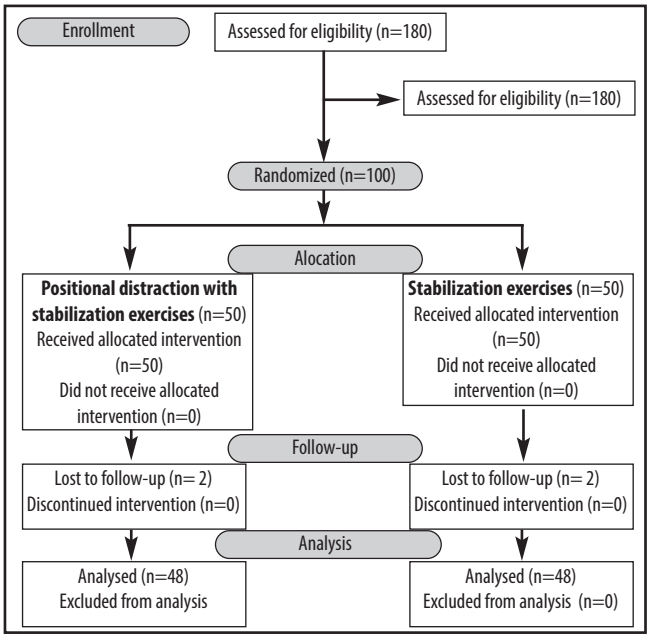

Figure-3: Consolidated standards of reporting trials (CONSORT) flow chart.

Intragroup improvement post-intervention compared to baseline was significant (p<0.001) in both groups. Outcomes in group A were significantly better for both VAS and RMDQ than in group B (p<0.05) (Table 2).

Discussion

The current findings indicated that after PD with stabilisation exercises for sciatica, there were important clinical changes in pain and disability compared to stabilisation exercises alone, which is consistent with earlier findings.[21,22]

Several studies have reported that sciatica commonly occurs in people aged 20-40 years, with higher prevalence

in males.[23] The present study also showed that sciatica was more common in males compared to females, and most patients were aged <40 years.

PD has significant effect on pain and disability for sciatica patients. It does not require any specific modalities and has been shown not only symptomatic relief, but also biomechanical changes that showed reduced vertebral and disc compression on the nerve.[24] The non-invasive spinal decompression therapy (NSDT) had a positive effect on the reduction of disc herniation in lumbar radiculopathy patients.[13] Chung TS et al. treated sciatica patients with continuous traction and found disc reduction, intervertebral foramen opening and widening of facet joint on MRI.[25] All these findings support the results of the present study.

Previously, different forms of tractions had been tested for its effectiveness in comparison to and in combination with other forms of physical therapy management in sciatica patients. Traction is commonly used by physical therapists in the management of sciatica to get beneficial effects[14] which is consistent with the present study. Another study showed that traction along with extension-oriented exercises did not have any superior results over extension-oriented exercises alone in pain and disability.[15]

In the present study, stabilisation exercises were used along with traction in line with a study which showed that stabilisation exercises were effective in improving pain and disability issues in sciatica.[26]

The current study has limitations as it used a specific inclusion criterion which has limited the generalisability of the findings to all sciatica patients. Also, the study recorded only baseline and post-intervention evaluations without a long-term follow-up. Further studies are recommended that may take these limitations into consideration.

Conclusion

PD with stabilisation exercises was found to be more effective in reducing pain and improving disability compared to stabilisation exercises alone in the management of lumbar radiculopathy.

Acknowledgement: We are grateful to the participants and to all those who facilitated the study in any manner.

Disclaimer: None.

Conflict of Interest: None.

Source of Funding: None.

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Author Contribution:

SK: Questionnaire design, data collection, article drafting, interpretation of results, discussion.
FH: Concept, literature review, design of work, interpretation of results, discussion.
RR: Analysis, discussion, proofreading.
AR: Data analysis, interpretation, drafting.
SK: Literature review, interpretation of results, discussion.