



Effect Of Motor Control Exercises And Conventional Back Exercises In Lumbar Spondylosis

Patel Payal Kishorbhai¹, Dr. D. N. Bid (PT), MPT Ortho, PGDSPT²

¹Master of Physiotherapy student (Musculoskeletal Sciences)
The Sarvajanik College of Physiotherapy,
Veer Narmad South Gujarat University, Surat, Gujarat, India

²Professor, The Sarvajanik College of Physiotherapy,
Veer Narmad South Gujarat University, Surat, Gujarat, India

1. Introduction

Low back pain (LBP) is one of the leading causes of disability worldwide and affects a large portion of the adult population. Studies report that approximately 60–85% of individuals experience low back pain at some point in their lifetime. Lumbar spondylosis is a degenerative condition affecting the intervertebral discs, vertebral bodies, and associated joints of the lumbar spine.

The condition is characterized by disc degeneration, osteophyte formation, and narrowing of the intervertebral spaces. These degenerative changes may lead to symptoms such as chronic low back pain, stiffness, and functional limitations.

Physiotherapy plays a crucial role in the management of lumbar spondylosis. Various interventions including strengthening exercises, McKenzie exercises, electrotherapy, and motor control exercises are used to reduce pain and improve function. Motor control exercises specifically target deep stabilizing muscles such as the transversus abdominis and lumbar multifidus, which are essential for spinal stability.

Despite growing evidence supporting motor control exercises for chronic low back pain, limited research exists comparing motor control exercises with conventional back exercises specifically in patients with lumbar spondylosis. Therefore, the present study was conducted to evaluate and compare the effectiveness of these two exercise approaches.

2. Review of Literature

Several studies have investigated the role of motor control exercises in the management of low back pain.

Byström et al. conducted a meta-analysis and concluded that motor control exercises significantly reduce pain and disability in individuals with chronic low back pain. Macedo et al. performed a randomized controlled trial comparing motor control exercises with graded activity exercises and found both interventions to have similar effects in improving pain and function.

Unsgaard-Tøndel et al. compared motor control exercises, sling exercises, and general exercises in patients with chronic low back pain and reported improvements across all exercise interventions. Franca et al. compared segmental stabilization exercises with superficial strengthening exercises and concluded that stabilization exercises produced better outcomes in reducing pain and disability.

Additionally, Akbari et al. demonstrated that motor control exercises improved lumbar muscle thickness and reduced pain in patients with chronic low back pain.

However, most of these studies focused on non-specific low back pain, and limited evidence exists regarding the effectiveness of motor control exercises in patients specifically diagnosed with lumbar spondylosis.

3. Methodology

Study Design

Two-group pre-post experimental study.

Study Population

Patients diagnosed with lumbar spondylosis.

Sample Size

A total of 44 subjects were included in the study, with 22 participants in each group.

Sampling Technique

Purposive sampling.

Study Duration

March 2016 to February 2017.

Inclusion Criteria

- Age between 40–60 years
- Both male and female participants
- Pain score greater than 5 on NPRS

Exclusion Criteria

- History of spinal surgery
- Spondylolisthesis or sacroiliac joint disorders
- Malignancy
- Cardiovascular or respiratory disorders
- Pregnancy
- Spinal infection or inflammatory joint disease

Outcome Measures

1. Numerical Pain Rating Scale (NPRS)
2. Back Performance Scale (BPS)

Intervention

Group A – Motor Control Exercise Group

Participants performed motor control exercises focusing on activation of deep spinal stabilizers such as the transversus abdominis and lumbar multifidus.

Group B – Conventional Exercise Group

Participants received conventional back exercises including pelvic tilt, pelvic bridging, double knee to chest, hip roll, cat-camel exercises, and TENS therapy.

Both groups performed exercises for **30–45 minutes per session, 5 days per week for 4 weeks.**

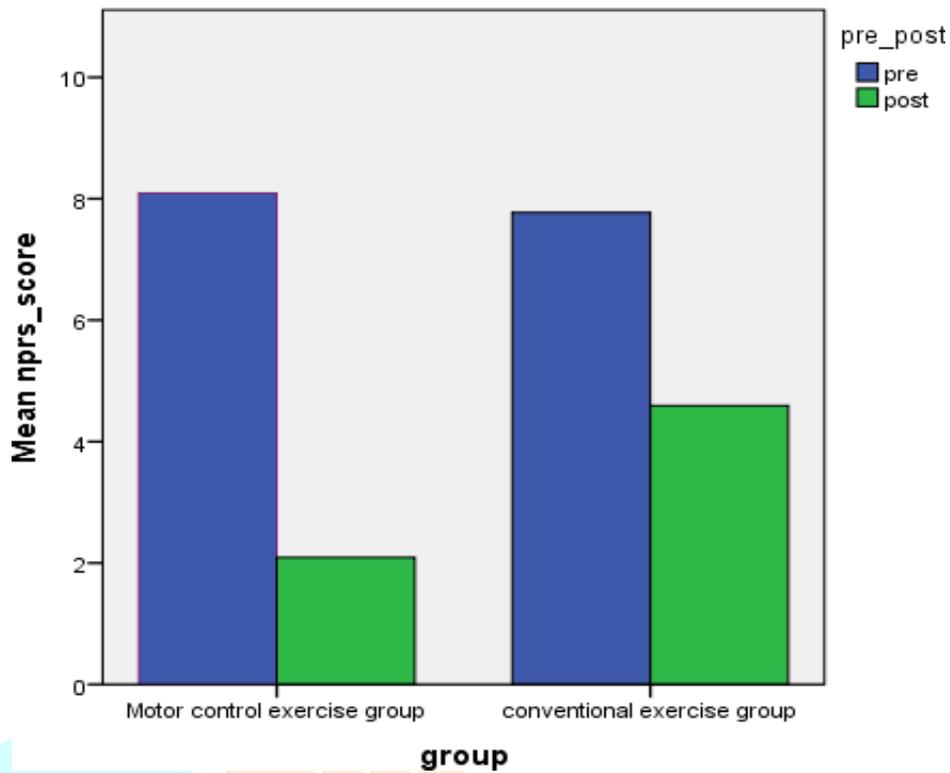
4. Results

Statistical analysis was performed using SPSS version 20.0. Since data were not normally distributed, non-parametric tests were applied.

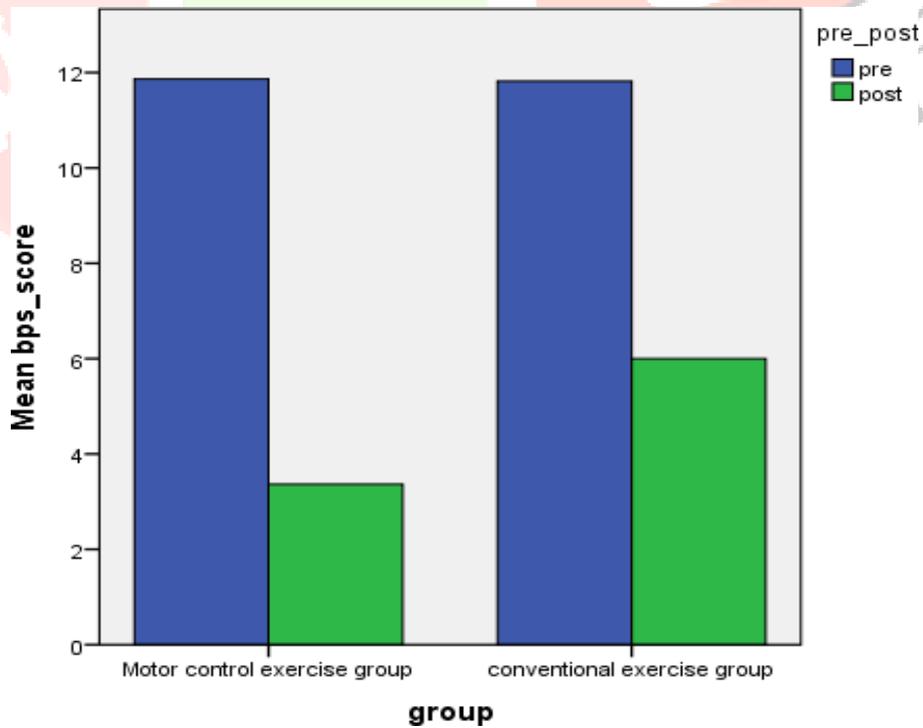
Wilcoxon Signed Rank Test was used for within-group comparisons, and Mann-Whitney U Test was used for between-group comparisons.

Both groups demonstrated significant improvement in NPRS and BPS scores after 4 weeks of treatment ($p < 0.05$). However, the motor control exercise group showed greater reduction in pain and functional disability compared to the conventional exercise group.

Mean NPRS scores in the motor control exercise group improved from **8.09 to 2.09**, whereas in the conventional exercise group they improved from **7.77 to 4.59**.



Similarly, BPS scores improved from **11.86 to 3.36** in the motor control exercise group and from **11.82 to 6.00** in the conventional exercise group.



5. Discussion

The present study aimed to compare the effectiveness of motor control exercises and conventional back exercises in patients with lumbar spondylosis.

The findings demonstrated that both exercise programs significantly reduced pain and functional disability. However, the motor control exercise group showed superior outcomes compared to the conventional exercise group.

Motor control exercises primarily target deep stabilizing muscles of the spine, including the transversus abdominis and lumbar multifidus. Previous studies have reported that dysfunction of these muscles contributes to spinal instability and chronic low back pain.

Activation and strengthening of these stabilizing muscles help improve spinal control, reduce mechanical stress on spinal structures, and enhance functional performance.

These findings are consistent with previous research indicating that stabilization exercises are effective in reducing pain and improving function in patients with spinal disorders.

6. Conclusion

The study concludes that both motor control exercises and conventional back exercises significantly reduce pain and functional disability in patients with lumbar spondylosis.

However, motor control exercises demonstrated greater effectiveness in improving clinical outcomes compared to conventional back exercises.

Therefore, motor control exercises may be considered a more effective physiotherapy intervention for managing lumbar spondylosis.

References

1. Luciana G Macedo, Christopher G Maher et al Motor Control Exercise for Persistent, Nonspecific Low Back Pain: A Systematic Review *PHYS THER.* 2009 Jan; 89(1):9-25.
2. University health services low back pain physical health
3. Frymoyer JW. Back pain and sciatica. *N Engl J Med* 1988;318:291-300
4. Anderson GBJ. The epidemiology of spinal disorders. In: Frymoyer JW, editor. *The adult spine: principles and practice*, 2nd edition. New York: Raven Press 1997:93-141
5. Burton AK, Clarke RD, Mc Clude TD et al the natural history of LBP in adolescents. *Spine* 1996; 21: 2323-28.
6. Deyo RA. Nonsurgical care of low back pain. *Neurosurgical clinics of North America.* 1991; 2: 851-62.
7. Anderson GBJ. Epidemiology features of chronic low-back pain. *Lancet* 1999; 354: 581-85.
8. Waddell G.A. New clinical model for the treatment of low-back pain. *Spine* 1987; 12:632-

- 44.
9. Biering-Sørensen F. A prospective study of low-back pain in a general population. Occurrence, recurrence and aetiology. *Scand J Rehabil Med* 1983; 15:71-79.
10. Clinical standards Advisory Group. Epidemiology review: the epidemiology and cost of low back pain. London: HMSO;1994
11. Supreet Bindra et.al epidemiology of low back pain in Indian population: A review *International Journal of Basic and Applied Medical Science*. 2015 January-April; 5 (1): 166-179.
12. Kimberley Middleton, David E. Fish, Lumbar spondylosis: clinical presentation and treatment approaches *Curr Rev Musculoskelet Med* 2009 march; 2:94–104.
13. Laura Bronckaerts et al lumbar spondylosis in musculoskeletal and Orthopedic group *Physio Pedia* http://www.physio-pedia.com/Lumbar_Spondylosis.
14. Middleton, Kimberley, and David E. Fish. “Lumbar Spondylosis: Clinical Presentation and Treatment Approaches.” *Current Reviews in Musculoskeletal Medicine* 2009 march; 2(2): 94–104.
15. Gibson, J. N. Alastair, and Gordon Waddell. “Surgery for Degenerative Lumbar Spondylosis: Updated Cochrane Review.” 2005 October; 23:12–20.
16. Laxmaiah Manchikanti, Epidemiology of Low Back Pain, *Pain Physician* 2000; 3(2): 167-192.
17. Yamada Y, Okuizumi H, Miyauchi A, et al. Association of transforming growth factor beta1 genotype with spinal osteophytosis in Japanese women. *Arthritis Rheum*. 2000 Feb. 43(2):452-60.
18. Zukowski LA, Falsetti AB, Tillman MD. The influence of sex, age and BMI on the degeneration of the lumbar spine. *J Anat*. 2012 Jan. 220 (1):57-66.
19. Muraki, S., et al, Prevalence of radiographic lumbar spondylosis and its association with low back pain in elderly subjects of population-based cohorts: the ROAD study, *Ann Rheum Dis* 2009; 68: 1401-1406.
20. Cherubino P. et al, Spondylosis and lumbar instability: pathologic changes, *Chir Organi Mov*. 1994 Jan-Mar; 79(1):11-8.

21. <https://s-media-cache.jpg>
22. Miller R, Beck NA, Sampson NR, Zhu X, Flynn JM, Drummond D. Imaging modalities for low back pain in children: a review of spondylosis and undiagnosed mechanical back pain. *J Pediatr Orthop*. 2013 Apr-May. 33(3):282-8.
23. O'Neill TW, McCloskey EV, Kanis JA, et al. The distribution, determinants, and clinical correlates of vertebral osteophytosis: a population based survey. *J Rheumatol*. Apr 1999; 26(4):842-8.
24. Yoshimura N, Dennison E, Wilman C, et al. Epidemiology of chronic disc degeneration and osteoarthritis of the lumbar spine in Britain and Japan: a comparative study. *J Rheumatol*. 2000 Feb. 27(2):429-33.
25. Brooks BK et al., Lumbar spine spondylolysis in the adult population: using computed tomography to evaluate the possibility of adult onset lumbar spondylosis as a cause of back pain. *Skeletal Radiol.*, 2010.
26. McIntosh, G., et al, Low back pain (acute), 2011.
27. Schneck, Carson, PHD., The anatomy of lumbar spondylosis, clinical orthopaedics &&&& related research, section i: symposium: posterior lumbar interbody fusion, march 1985.
28. P.B. O'Sullivan, L.T. Twomey and G.T. Allison, Evaluation of specific stabilizing exercise in the treatment of chronic low back pain with radiologic diagnosis of spondylolysis or spondylolisthesis, *Spine* 1997 ;22(24) : 2959–296.
29. C.A. Richardson, G.A. Jull, P.W. Hodges et al., Therapeutic Exercise for Spinal Segmental Stabilization in Low Back Pain, Edinburgh: Churchill Livingstone, 1999.
30. L. Moseley, Combined physiotherapy and education is efficacious for chronic low back pain, *Aust J Physioter* 2002; 48: 297–302.
31. G.A. Koumantakis, P.J. Watson and J.A. Oldham, Trunk muscles stabilization training plus general exercise versus general exercise only: randomized controlled trial of patient with recurrent low back pain, *PHYS THER*2005; 85(3) : 209–225.
32. C.A. Richardson and G.A. Jull. Muscle control-pain control. What exercises would you

- prescribe? *Manual Therapy* 1995; 1:2–10.
33. Martin Gustaf Byström et al Motor Control Exercises Reduces Pain and Disability in Chronic and Recurrent Low Back Pain A Meta-Analysis, *SPINE*; 38(6): 350–358.
34. Macedo L G et al., Motor control or graded activity exercises for chronic low back pain? A randomised controlled trial. *BMC Musculoskeletal Disorders* 2008; 9:65
35. Monica Unsgaard-Tøndel et al Motor Control Exercises, Sling Exercises, and General Exercises for Patients With Chronic Low Back Pain: A Randomized Controlled Trial With 1-Year Follow-up, *Physical Therapy* 2010 October ; 90 (10):1426-1440.
36. Fa´bio Renovato Franca et al Segmental stabilization and muscular strengthening in chronic low back pain - a comparative study, *Clinical science* 2010; 65(10):1013-1017.
37. Eva Rasmussen-Barr et al Motor Control Exercises Reduces Pain and Disability in Chronic and Recurrent Low Back Pain, *SPINE* 2013; 38(6): 350–358.
38. Leonardo O.P. Costa et al Motor Control Exercise for Chronic Low Back Pain: A Randomized Placebo-Controlled Trial, *physical Therapy* 2009; 89:1275-1286.
39. Asghar Akbaria et.al the effect of motor control exercise versus general exercise on lumbar local stabilizing muscles thickness: Randomized controlled trial of patients with chronic low back pain, *Journal of Back and Musculoskeletal Rehabilitation* 2008;21:105–112.
40. Luciana G Macedo et al Motor Control Exercise for Persistent, Nonspecific Low Back Pain: A Systematic Review, *Physical Therapy*, 2009 Jan; 89(1):9-25.
41. Critchley D J et al, Effectiveness and Cost-Effectiveness of Three Types of Physiotherapy Used to Reduce Chronic Low Back Pain Disability, *SPINE*, 2007; 32(14): 1474–1481.
42. Manuela L. Ferreira et al Comparison of general exercise, motor control exercise and spinal manipulative therapy for chronic low back pain: A randomized trial, *Pain*; 2007:31–37.
43. Hjerstad MJ et al. Studies comparing Numerical Rating Scales, Verbal Rating Scales, and Visual Analogue Scales for assessment of pain intensity in adults: a systematic literature review. *Journal of pain and symptom management*. 2011; 41(6):1073-93.
44. Ferreira-Valente MA, Pais-Ribeiro JL, Jensen MP. Validity of four pain intensity rating scales. *Pain*. 2011; 152 (10):2399-404.

45. Childs JD, Piva SR, Fritz JM. Responsiveness of the numeric pain rating scale in patients with low back pain. *Spine*. 2005; 30 (11):1331-4.
46. Liv Magnussen et al Reliability and Validity of the Back Performance Scale: Observing Activity Limitation in Patients with Back Pain, *SPINE*; 29(8): 903–907.
47. Liv Inger Strand et al, Back Performance Scale for the Assessment of Mobility-Related Activities in People with Back Pain. *Physical Therapy* 2002 December; 82(12): 1213- 1223.
48. Keith strange, physical therapy exercises for lumbar spondylosis; 2015 June.
49. L.I.Strand et al., The impact of physical function and pain on work status at 1-year follow up in patients with back pain, *Spine* 2001;26:800–808.
50. Hodges PW, Richardson CA. Inefficient muscular stabilization of the lumbar spine associated with low back pain: A motor control evaluation of transversus abdominis. *Spine* 1996; 21 :2640-50.

LIMITATIONS

- Study duration was limited.
- Small range group between 40-60 years of age group.
- The results cannot be generalized to individual age.
- Short duration study in which follow up was not done.
- Limited availability of the equipment.

FURTHER RECOMMENDATIONS

- The study should have a follow up in order to evaluate the effectiveness that is maintained or not for what period of time.
- The study can be done with use of various measurements of muscle contraction.

ETHICAL CLEARANCE

- Ethical clearance was obtained from Institutional ethical committee of The Sarvajanik College of Physiotherapy, Surat.