

Effects of Muscle Energy Technique with Interferential Therapy and Global Postural Re-Education with Interferential Therapy on Low Back Pain and Functional Disability in Patients with Lower Cross Syndrome

Dr. S. Guhan¹, Dr. R. Jayabharathi², Dr. Anusree G³, Dr. Ayesha Sana⁴

¹Professor, MPT (Neuro) (PhD), Sree Abirami College of Physiotherapy, Coimbatore, Tamil Nadu, India
Email: guhanphysio[at]abiramiedu.in

²Professor, MPT (Ortho), PhD, Sree Abirami College of Physiotherapy, Coimbatore, Tamil Nadu, India
Email: principalphysio[at]abiramiedu.in

³BPT, Sree Abirami College of Physiotherapy, Coimbatore, Tamil Nadu, India
Email: anusreegovindarajp[at]gmail.com

⁴BPT, Sree Abirami College of Physiotherapy, Coimbatore, Tamil Nadu, India
Email: sanashajid17[at]gmail.com

Abstract: Lower Cross Syndrome (LCS) is characterized by an imbalance between shortened/overactive hip flexors and thoracolumbar extensors and weakened abdominal and gluteal musculature. This study investigated the effects of Muscle Energy Technique (MET) with Interferential Therapy (IFT) and Global Postural Re-education (GPR) with IFT on low back pain and functional disability in patients with LCS. A quasi-experimental study was conducted among 20 participants aged 20–35 years at the Department of Physiotherapy, Sree Abirami College of Physiotherapy and Sree Abirami Hospital, Coimbatore. Participants were assigned by convenient sampling into Group A (MET with IFT; n=10) and Group B (GPR with IFT; n=10). Both groups received 45-minute sessions, three times weekly, for six weeks. Pain was assessed using the Visual Analogue Scale (VAS) and functional disability using the Modified Oswestry Disability Index (MODI). Paired t-test demonstrated significant pre- to post-test improvements in both groups. Between-group analysis of post-test scores showed significant differences for VAS ($t=3.79$) and MODI ($t=4.88$), with lower post-test scores in Group A. Within the limits of this study, MET combined with IFT produced greater improvement in pain and functional disability than GPR combined with IFT in participants with LCS.

Keywords: Lower Cross Syndrome, Muscle Energy Technique, Global Postural Re-education, Interferential Therapy, Low back pain, Modified Oswestry Disability Index

1. Introduction

Lower Cross Syndrome, also described as pelvic or distal crossed syndrome, is a postural and muscular imbalance involving tight thoracolumbar extensors and hip flexors with weakness of the deep abdominal and gluteal muscles.[1] The pattern may be associated with anterior pelvic tilt, increased lumbar lordosis, altered lumbopelvic mechanics, stiffness and low back pain. Prolonged sitting, poor posture, reduced physical activity and inadequate core or gluteal conditioning are described as contributing factors in the project literature.[1]

Low back pain is commonly associated with functional limitation, and the muscular imbalance described in LCS may contribute to altered loading of the lumbar region. [1,2] Physiotherapy management may include postural training, stretching and strengthening, core stabilization and other therapeutic approaches.

Muscle Energy Technique is a manual therapy approach involving voluntary muscle contraction followed by

relaxation and stretching. Post-isometric relaxation is described in the project as a specific form of MET used to address muscle tightness and improve mobility.[3] Global Postural Re-education is a postural approach based on prolonged, controlled postures intended to lengthen shortened muscle chains and facilitate more appropriate activation of opposing musculature. [4, 5]

Interferential Therapy is an electrotherapeutic modality in which alternating currents interact to produce a resultant current in the tissues.[6] Previous studies cited in the project report beneficial effects of IFT on pain and functional outcomes in chronic or nonspecific low back pain. [7–9] However, the project identified limited direct comparison of MET with IFT and GPR with IFT in patients specifically presenting with LCS.

2. Need for the Study

The prevalence of LCS with low back pain has been reported in young adults, and physiotherapy interventions are used to address associated pain and functional disability. The present

study was undertaken to investigate and compare the effects of MET with IFT and GPR with IFT on low back pain and functional disability in patients with LCS.

3. Aim

To investigate the effects of Muscle Energy Technique with Interferential Therapy and Global Postural Re-education with Interferential Therapy on low back pain and functional disability in patients with Lower Cross Syndrome.

4. Objectives

- 1) To determine the effects of MET with IFT on low back pain and functional disability in patients with LCS.
- 2) To determine the effects of GPR with IFT on low back pain and functional disability in patients with LCS.
- 3) To compare the effects of the two treatment approaches.

5. Hypothesis

Null hypothesis: There is no significant difference between MET with IFT and GPR with IFT on low back pain and functional disability in patients with LCS. Alternative hypothesis: There is a significant difference between the two interventions.

6. Materials and Methods

6.1 Study Design and Setting

A quasi-experimental study was conducted in the Department of Physiotherapy, Sree Abirami College of Physiotherapy and Sree Abirami Hospital, Coimbatore.[10]

6.2 Participants and Sampling

Twenty subjects meeting the inclusion and exclusion criteria were selected by convenient sampling and assigned to two groups of 10 participants each. Participants were aged 20–35 years. Inclusion criteria included chronic low back pain of three months or more, a Lower Cross Syndrome pattern in standing, and prolonged sitting with poor posture. Patients with acute disc bulge, lumbar instability, fracture, inflammatory disorder, previous surgery involving the back/pelvis/sacrum, or systemic disease were excluded.[10]

6.3 Intervention

Group A received MET with IFT and Group B received GPR with IFT. Both groups received 45-minute sessions, one session per day, three sessions per week, for six weeks.[10]

For both groups, IFT was delivered in prone lying using a tetrapolar electrode arrangement. The documented parameters were a 4000-Hz carrier frequency, 20-Hz modulated frequency, 10-Hz sweep frequency, 1:1 sweep pattern, rhythmic mode, intensity to patient tolerance, and 15 minutes of treatment per session.[10]

For Group A, the 30-minute MET component included a warm-up, post-isometric relaxation for the hip flexors and

thoracolumbar extensors, and a cool-down. For the hip flexors, the patient performed a gentle isometric hip-flexion contraction at approximately 20–25% of maximum contraction followed by relaxation and progressive passive stretching. The thoracolumbar extensors were treated using a submaximal trunk-extension contraction followed by relaxation and passive stretching. Each technique was performed for 10 seconds of contraction, 5 seconds of hold, and 30 seconds of stretch, for five repetitions and two sets.[10]

For Group B, the 30-minute GPR component used lying and standing postural sequences. The lying posture emphasized the anterior chain with controlled breathing and progressive limb positioning. The standing/posterior-chain sequence progressed through hip flexion, knee extension and ankle dorsiflexion while maintaining a gradual stretch.[10]

6.4 Outcome Measures

Pain intensity was measured using the Visual Analogue Scale (VAS), and functional disability was assessed using the Modified Oswestry Disability Index (MODI).[10,11] VAS is a 100-mm scale anchored by descriptors representing the severity of pain. MODI is a self-reported measure of pain-related functional disability; the project describes scoring as a percentage of the total possible score.[11]

6.5 Statistical Analysis

Paired t-tests were used to compare pre-test and post-test scores within each group. Unpaired t-tests were used to compare the groups. Statistical significance was assessed at the 5% level.[10]

7. Results

Twenty participants completed the study, with 10 participants in each group. The treatment period was six weeks.[10]

Table 1: Pre-test and post-test VAS scores

Group	Pre-test mean $\pm$ SD	Post-test mean $\pm$ SD	Mean difference	Paired t
Group A (MET+IFT)	7.10 $\pm$ 0.74	4.50 $\pm$ 1.08	2.60	8.51
Group B (GPR+IFT)	7.30 $\pm$ 0.67	6.20 $\pm$ 0.92	1.10	6.12

Within-group analysis showed significant improvement in VAS scores in both groups. Group A decreased from 7.10 to 4.50 (paired $t=8.51$), while Group B decreased from 7.30 to 6.20 (paired $t=6.12$). Both calculated t-values exceeded the stated critical value of 2.262 at 9 degrees of freedom.[10]

Table 2: Between-group comparison of VAS

Time	Group A	Group B	Mean difference	Unpaired t
Pre-test	7.10 $\pm$ 0.74	7.30 $\pm$ 0.67	0.20	0.632
Post-test	4.50 $\pm$ 1.08	6.20 $\pm$ 0.92	1.70	3.79

The pre-test comparison showed no significant difference between groups ($t=0.632$; critical $t=2.101$). The post-test comparison showed a significant between-group difference

($t=3.79$; critical $t=2.101$), with the lower post-test VAS mean in Group A. [10]

Table 3: Pre-test and post-test MODI scores

Group	Pre-test mean $\pm$ SD	Post-test mean $\pm$ SD	Mean difference	Paired t
Group A (MET+IFT)	49.10 $\pm$ 2.60	38.10 $\pm$ 4.43	11.00	7.067
Group B (GPR+IFT)	47.70 $\pm$ 1.89	45.90 $\pm$ 2.42	1.80	4.323

Within-group analysis demonstrated significant improvement in MODI scores in both groups. Group A decreased from 49.10 to 38.10 (paired $t=7.067$), and Group B decreased from 47.70 to 45.90 (paired $t=4.323$). Both calculated t-values exceeded the stated critical value of 2.262.[10]

Table 4: Between-group comparison of MODI

Time	Group A	Group B	Mean difference	Unpaired t
Pre-test	49.10 $\pm$ 2.60	47.70 $\pm$ 1.89	1.40	1.377
Post-test	38.10 $\pm$ 4.43	45.90 $\pm$ 2.42	7.80	4.88

The pre-test MODI comparison showed no significant difference between groups ($t=1.377$; critical $t=2.101$). The post-test comparison showed a significant between-group difference ($t=4.88$; critical $t=2.101$), with a lower post-test MODI mean in Group A. [10]

8. Discussion

The present study investigated the effects of MET with IFT and GPR with IFT in patients with LCS. Both groups demonstrated statistically significant improvements in pain and functional disability following six weeks of treatment. [10]

The reduction in VAS in Group A is consistent with literature cited in the project describing MET as an approach that may reduce muscle tension and improve extensibility. Attar et al. reported improvements in pain and disability following MET in patients with LCS, while Khan et al. reported improvement following MET although their between-group findings did not demonstrate a statistically significant difference compared with stretching. [12, 13]

The improvement observed with GPR with IFT is consistent with studies cited in the project. Bonetti et al. reported improvement in pain and disability following a GPR programme in persistent low back pain, and Gonzalez-Medina et al. reported that GPR may reduce pain and improve function in chronic nonspecific low back pain. [5, 14]

IFT was used as an adjunct in both groups. Previous work cited in the project has reported beneficial effects of interferential current on pain and disability in low back pain. [7–9] The common IFT component therefore provided a similar electrotherapeutic intervention to both groups while the principal difference between groups was the manual/postural treatment approach.

The baseline values were comparable for VAS and MODI because the pre-test between-group analyses were not statistically significant.[10] After six weeks, the post-test differences were statistically significant for both outcomes, and Group A had lower mean scores. These findings indicate greater improvement in the measured outcomes in Group A within this sample; however, the small sample and study design limit the extent to which the findings can be generalized.

9. Conclusion

Both MET with IFT and GPR with IFT produced significant pre- to post-treatment improvements in low back pain and functional disability in the participants with Lower Cross Syndrome. Between-group post-test analysis demonstrated significant differences in VAS and MODI scores, with lower scores in the MET with IFT group. Based on the statistical results of this study, MET combined with IFT showed greater improvement in the measured pain and functional disability outcomes than GPR combined with IFT.[10]

10. Limitations

The study had a small sample size, a relatively short study period, and was limited to participants aged 20–35 years. Psychological factors and participants' routine activities of daily living could not be fully controlled during the testing period.[10]

11. Recommendations

Future studies may include larger sample sizes, longer study durations, broader age groups, and additional physiotherapy techniques for Lower Cross Syndrome. These recommendations are consistent with those stated in the original project.[10]

References

- [1] Magee DJ. Orthopedic Physical Assessment. 8th ed. St. Louis: Elsevier; 2021.
- [2] Maher C, Underwood M, Buchbinder R. Non-specific low back pain. *Lancet*. 2017;389(10070):736–747.
- [3] Chaitow L, Crenshaw K. Muscle Energy Techniques. 4th ed. Elsevier Health Sciences; 2006.
- [4] Dimitrova E, Rohleva M. Global postural reeducation in the treatment of postural impairments. *Res Kinesiology*. 2014;4(1):72–75.
- [5] Bonetti F, Curti S, Mattioli S, Mugnai R, Vanti C, Violante FS, et al. Effectiveness of a Global Postural Reeducation program for persistent low back pain: a non-randomized controlled trial. *BMC Musculoskeletal Disorder*. 2010; 11: 1–2.
- [6] Singh J. Interferential Therapy. 3rd ed.
- [7] Albornoz-Cabello M, Maya-Martín J, Domínguez-Maldonado G, Espejo-Antúnez L, Heredia-Rizo AM. Effect of interferential current therapy on pain perception and disability level in subjects with chronic low back pain: a randomized controlled trial. *Clin Rehabil*. 2017;31(2):242–249.

- [8] Jung KS, In TS. Effects of interferential current treatment on pain, disability, and balance in patients with chronic low back pain: a randomized controlled study. *J Korean Soc Phys Med.* 2020;15(3):21–27.
- [9] Fuentes JP, Armijo Olivo S, Magee DJ, Gross DP. Effectiveness of interferential current therapy in the management of musculoskeletal pain: a systematic review and meta-analysis. *Phys Ther.* 2010;90(9):1219–1238.
- [10] Lower Cross Syndrome Final Project. Sree Abirami College of Physiotherapy, Coimbatore. 2026.
- [11] Fairbank JCT, Pynsent PB. The Oswestry Disability Index. *Spine.* 2000;25(22):2940–2952.
- [12] Attar AA, Maryam I, Mehmood M, et al. Comparative effects of Muscle Energy Technique and Proprioceptive Neuromuscular Facilitation stretching in the management of Lower Cross Syndrome. *J Health Rehabil Res.* 2024;4(3).
- [13] Khan N, Nouman M, Iqbal MA, et al. Comparing the effect of stretching and Muscle Energy Technique in the management of Lower Cross Syndrome. *Pak J Med Health Sci.* 2022;16(7):31.
- [14] Gonzalez-Medina G, Perez-Cabezas V, Ruiz-Molinero C, Chamorro-Moriana G, Jimenez-Rejano JJ, Galán-Mercant A. Effectiveness of global postural re-education in chronic non-specific low back pain: systematic review and meta-analysis. *J Clin Med.* 2021;10(22):5327

Author Profile

Prof. **Dr. S. Guhan.**, MPT (Neuro) (PhD)., Vice Principal
Orchidid:0009-0001-82288161



Prof. **Dr. R. Jayabharathi**, MPT(Ortho)., Phd.,
Principal
Orchid id:0000-0002-7025-313X