



Effect of muscle energy technique versus active release technique on improving iliopsoas flexibility and reduction of pain in students with low back pain

S R Jenifer Blessy¹, K Saravanan²

¹ Sri Ramakrishna College of Physiotherapy, SRH, Coimbatore, Tamil Nadu, India

² Professor, Sri Ramakrishna College of Physiotherapy, SRH, Coimbatore, Tamil Nadu, India

Abstract

Introduction: Low back pain (LBP) is a common musculoskeletal problem globally in all age groups. Many risk factors like occupational posture, obesity, body height, and age, contribute to low back pain but the causes of the onset is unknown and the diagnosis is difficult to make. There is emerging evidence that low back pain coexists with hip disorder of which hip flexors that are too tight pose a risk for lower back pain. Various researches addressed some techniques to improve the flexibility of muscles causing low back pain. Hence, this study aimed to identify the effect of Muscle Energy Technique and Active Release Technique on improving flexibility and reduction of pain in students with low back pain.

Methodology: 30 students were selected using convenient sampling method and randomly divided into two groups. Group A (n=15) received MET and Group B (n=15) received ART of iliopsoas muscle for 3 sessions per week for 3 weeks. The pre and post-test values were measured using Angulus (smartphone app) to measure Hip Flexion Angle and Numerical Pain Rating Scale to evaluate pain severity.

Result: The intra group analysis showed statistically significant improvement in hip flexion angle ($t=15.89$) and pain severity ($t=8.98$) of active release technique group B than the muscle energy technique group A at 5% level of significance. The intergroup comparisons showed statistically significant differences in favour of group B.

Conclusion: Both the groups showed only minimal significant difference on comparison and they have been found to be effective in addressing iliopsoas tightness. Therefore, the study concludes, active release technique demonstrated more short-term outcomes in improving flexibility of iliopsoas muscle and reducing low back pain in students.

Keywords: active release technique (ART), muscle energy technique (MET), Iliopsoas flexibility, hip flexion angle (HFA), low back pain, numerical pain rating scale (NPRS).

Introduction

Low back pain (LBP) is a common musculoskeletal problem globally in all age groups. LBP affects approximately 80% of individuals at some time in life [1]. According to the Global Burden of Disease Study (GBD) in 2017 [2], It is one of the causes of living with a disability affecting general well-being and performance at daily activities [2]. Low back pain can be acute, sub-acute, or chronic [3].

Though several risk factors have been identified (including occupational posture, obesity, body height, and age), the causes of the onset of low back pain remain obscure, and diagnosis is difficult to make. Low back pain is not a disease but a constellation of symptoms. In most cases, the origins remain unknown. There is emerging evidence that low back pain coexists with hip disorder. The hip flexor muscles are significant contributors to lumbar spine stability. Tight hip flexors pose a risk for lower back pain [4]. Hence, an optimum amount of range of motion (ROM) in the hip flexors is required and 83.3% of individuals experience LBP due to tightness of the iliopsoas muscle with limited hip range of motion [5].

The iliopsoas, innermost muscle of the lumbosacral spine and anterior hip is regarded as the strong primary flexor of the hip, a confluence of the psoas major and iliacus muscle. These muscles have a separate origin, the iliacus originating from the iliac fossa and psoas major from the transverse process of T12 - L5. These muscles fuses at the level of L5-S2 and insertes into the lesser trochanter [6]. The Iliopsoas,

play a significant role in maintaining posture & stabilization of the trunk on the pelvis during antigravity activities. Iliopsoas muscles are not commonly stretched in the activities of daily living, leading to the tightness of Iliopsoas. Sitting, standing, and other antigravity tasks for an extended period of time drive a prolonged load on muscles and increase the risk of injury [7]. It is evident that the sedentary nature makes them prone to acquire adaptive shortening and these changes predominantly occur to a greater degree in the muscle around the hip joint and therefore be associated with low back pain. To improve the flexibility of Iliopsoas, different techniques such as Proprioceptive neuromuscular facilitation technique (PNF), Muscle energy technique (MET), Soft tissue mobilization, Active release technique (ART), Stretching technique (static, ballistic) and Myofascial release (MFR) techniques are employed. Despite the evidence supporting the application of stretching, there is an emerging application of MET and ART in improving the flexibility of the iliopsoas muscle.

Muscle energy techniques (MET) were developed by two osteopathic physicians, Fred Mitchell, Sr., and Fred Mitchell, Jr. MET are forms of soft tissue, or joint, manipulation or mobilizations is useful in treating soft tissues, stretching tight muscles and fascia, reducing pain and improving circulation and lymphatic drainage [8]. There are two main physiological effects of MET, which are explained based on two distinct physiological processes, Post-isometric relaxation (PIR) and Reciprocal inhibition

(RI). This study focuses on the beneficial effects of PIR in improving iliopsoas flexibility.

Active Release Technique (ART), developed by Dr Michael Leahy, is also a soft tissue movement-based technique that includes the treatment of the broad pathological spectrum of injuries to the fascia, muscles, tendons, and nerves. This technique utilizes compressive, tensile and shear forces applied by manual touch to address repetitive strain, cumulative trauma injuries and constant pressure tension lesions [9].

Materials and method

30 participants with primary complaint of low back pain were selected through convenient sampling method based on the selection criteria at Sri Ramakrishna Institute of Paramedical Sciences.

Inclusion criteria were students between 18 and 25 years of age, pain less than 3 months of duration, who sits for more than 8 hours, and with positive modified Thomas test. Exclusion criteria includes any serious pathology of lower limb (neoplasm, fracture), history of trauma to the lumbar spine, pelvis & hip, Congenital malformations and neurological conditions.

Informed consent was obtained and clear explanation prior to their participation in the study was given. This is an experimental study design in which the participants were

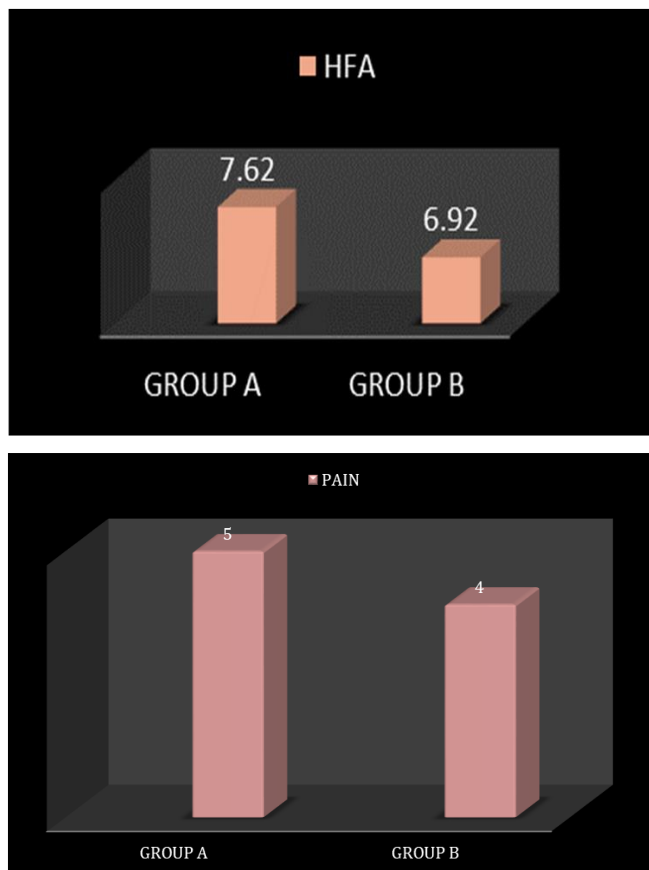
randomly divided into two groups. Group A received MET (5 repetitions) which involved post isometric relaxation of the iliopsoas muscle and group B ART (12 repetitions) of the same muscle in which pressure was applied next to the navel, inside the iliac crest and half way between the anterior superior iliac spine and pubic bone for 20-30 minutes a day, 3 sessions a week for 3 weeks. The hip flexion angle was measured using Angulus (ICC=0.89), a smartphone-based application and pain severity by Numeric Pain Rating Scale (r =0.95) before and after intervention. Postural education was given after the evaluation of the pre test scores.

Statistical analysis & results

The collected data were analyzed using Student t test. The intragroup analysis for hip flexion angle demonstrated group A and B showed statistically significant improvement of t=18.58, p<0.05 and t=15.89, p<0.05 respectively. The intragroup analysis of pain severity also demonstrated group A and B showed statistically significant improvement with t values 4.36 and 8.98 with p<0.05. The group B was more significant than the other. The inter group analysis of post test scores of group A and B showed statistically significant improvement with a t value of 3.519 for hip flexion angle and t value of 3.415 for pain severity at 28 degrees of freedom and 5% level of significance.

Table 1: Post- Test Mean Values of Hip Flexion Angle and Pain for Group-A and Group-B

Parameter	Post-test Mean A	Post-test Mean B	Mean Difference	Standard Deviation		Calculated t value	Table -t Value	Level of Significance
				A	B			
HFA	7.62	6.92	0.7	0.51	0.57	3.519	2.048	p<0.05
PAIN	5.00	4.00	1.00	0.85	0.76	3.415	2.048	p<0.05



Graph 1: post- test mean values of hip flexion angle and pain for group-A and group-B

Discussion

The results of this study demonstrated that participants who underwent Active release technique showed better outcomes on the hip flexion angle and pain than the Muscle energy technique. The novelty of this study is that it addresses low back pain in students caused due to iliopsoas muscle tightness. The mechanism underlying the significant improvement in MET Group A is attributed by the subsequent reduction in tone of agonist muscle after an isometric contraction and the golgi tendon organ inhibits over stretching of the muscle leading to reflex relaxation of the muscle. Fryer G *et al.*, suggested that activation of muscle and joint mechanoreceptors leads to sympathy oexciation evoked by somatic efferent and localized activation of periaqueductal grey matter that plays a role in descending modulation of pain [10].

In ART, the manual contact of the therapist stimulates the type IV receptors which reduces the pre synaptic inhibition in turn reducing the muscle tone breaking the pain spasm pain cycle. The reduction of muscle tone increases blood circulation and removes the inflammatory factors in the spasmodic muscles as a result of which the pain perception is decreased. The results of this study is also consistent with Daniel Avrahami *et al.*, who proposed improving the extensibility of the hip flexor complex in low back pain alleviates stress on the spine, decreases pain, Improve hip range of motion and possibly facilitates improved performance [11]. Chiou *et al.*, also demonstrated that the type IV receptors when linked to endocannabinoids in the CNS it induces presynaptic inhibition and improves the flexibility of the iliopsoas muscle.

Though both techniques showed significant improvement the ART was efficient enough to reduce pain in one session itself resulting in increased flexibility of iliopsoas muscles in short term in students with low back pain.

Conclusion

The study concludes that participants who received active release technique showed better short-term outcomes on hip flexion angle and pain, thus resulting in improved flexibility and reduction of pain in students with low back pain.

Scope of the study

The long-term outcomes can be identified. The chronic stages of low back pain can be studied and different measurement tools can be used for evaluation. Combined effects of these techniques with other approaches can be identified. Other factors contributing to iliopsoas tightness can be studied and intervened.

References

1. Augustus A, White III, Stephen L, Gordon. Synopsis: workshop on idiopathic low back pain. Spine, 1982, 7(2).
2. Aimin Wu, Lyn March, Damian Hoy, Global low. back pain prevalence and years lived with disability from 1990 to 2017: estimates from the Global Burden of Disease Study 2017, Ann Transl Med,2020:8(6):299.
3. B W Koes, M W van Tulder, Thomas St. Diagnosis and treatment of low back pain, BMJ, 2006, 332.
4. Andreas Konard, Richard Mocnik, Markus Tilp. The influence of stretching the hip flexor muscles on performance parameters. A systematic review with meta-analysis, International Journal of Environmental Research and Public Health,2021:18:1936.
5. Bashyal P, Bhatbolan S, Sindhu N. Flexibility in muscles around the hip among middle-aged Indian men engaging in prolonged desk jobs: A cross-sectional study, International Journal of Physical education, Sports and Health,2018:5(1):223-229.
6. Ivancevic T *et al*, The Evolved Athlete: A Guide for Elite Sport Enhancement, Cognitive System Monographs, Springer International Publishing AG 2017, 32.
7. Reuben S. Ingber. Iliopsoas Myofascial Dysfunction: A Treatable Cause of "Failed" Low Back Syndrome, Arch Phys Med Rehabil., 1989, 70.
8. Leon Chaitow. Muscle energy technique, fourth edition,2013(1)12-119.
9. Parth Trivedi, Sathiyavani D. Comparison of Active Release Technique and Myofascial Release Technique on Pain, Grip strength & Functional performance in patients with Chronic lateral epicondylitis, International Journal of Physiotherapy and Research,2014:2(3):488-94. ISSN 2321-1822.
10. Fryer G, Ruszkowski W. The influence of contraction duration in muscle energy technique applied to the atlanto-axial joint, J Osteopath Med,2004:7:79-84.
11. Daniel Avrahami, Potvin Jim R. The clinical and biomechanical effects of fascial muscular lengthening therapy on tight hip flexor patients with and without low back pain. J Can Chiropr Assoc, 2014. ISSN 1715-6181/2014/444-455.
12. Parashar P, Arunmozhi R, Kapoor C. Prevalence of low back pain due to abdominal weakness in young collegiate females, Indian Journal of Physical Therapy, 2(1).
13. Sapna Chaudhary, Tinkalben Patel. Improvement of iliopsoas flexibility: A comparative effectiveness between Post Isometric Relaxation and Static Stretching, Indian Journal of Physiotherapy and Occupational Therapy, 2020, 14(3).
14. Marie Corkery, Heather Briscoe. Establishing normal values for lower extremity muscle length in college-age students, Physical Therapy in Sport,2007:8:66-74.
15. De Stephano Rob, Hooper Joseph, Muscle Medicine. A revolutionary approach to maintaining, strengthening and repairing your muscles and joints. Touchstone, September, 2009, 15.
16. Mohammad Ali, Gias U. Ahsan, Prevalence and associated occupational factors of Low back pain among the bank employees in Dhaka city, Journal of Occupational Health,2020:62:1:2.
17. Aymeric Amelo t, Bertrand Mathon. Low back pain among medical students: a burden and an impact to consider! SPINE,2019:44(19):1390-1395.
18. Pagare, Veena K. Beliefs about low back pain: Status quo in Indian general population, Journal of Back and Musculoskeletal Rehabilitation,2015:731-737.
19. Nupur Aggarwal, Tanu Anand. Low back pain and associated risk factors among undergraduate students of a medical college in Delhi, Education for Health,2013:26(2):103.
20. Ewan Thomas, Antonio Rosario Cavallaro. The efficacy of muscle energy techniques in symptomatic subjects: a systematic review, Chiropractic & manual therapies, Article number,2019:35(1):1-18.
21. Fahmy E, Shaker H. Efficacy of spinal extension exercise program versus Muscle energy technique in the treatment of chronic mechanical low back pain, The Egyptian Journal of Neurology, Psychiatry and Neurosurgery article, 2109, 77.
22. Sejal Sailor, Yesha Mehta. A comparative study of Muscle Energy Technique and Positional Release Technique on hamstring flexibility in healthy individuals, Journal of Integrated Health Science, 9(2).
23. Praveen Kumar, Monika Moitra. Efficacy of Muscle Energy Technique and PNF stretching compared to conventional physiotherapy in the program of hamstring flexibility in chronic nonspecific low back pain, Indian Journal of Physiotherapy and Occupational therapy, 2015, 9(3).
24. Precious Barnes, Matthew Rivera. The effect of Active Release Technique on Clinician and Patient Reported Outcome: A Systematic Review, Journal of Sport Rehabilitation, 31(3).
25. Seung-Hoo Lee, Seung-Min Nam. Effect of Active release technique on Pain, Oswestry disability index and Pelvic asymmetry in chronic low back pain patients, Journal of the Korean Society of Physical Medicine,2020:15(1):133-141.
26. Vijay Kage, Rakhi Ratnam. Immediate effect of Active Release Technique versus Mulligan bent leg raise in subjects with hamstring tightness: Randomized clinical trial. International Journal of Physiotherapy and Research,2014:2(1):301-04. ISSN 2321-1822.
27. John D Childs, Sara R Piva. Responsiveness of pain, disability and physical impairment outcomes in patients with low back pain, Spine,2005:30(11):1331-1334.

28. Marianne Jensen Hiermstad, Peter M Favars. Studies comparing Numerical Rating Scales, Verbal Rating Scales, and Visual Analogue Scales for assessment of pain intensity in adults: a systematic literature review, *J Pain Symptom Manage*,2011;41(6):1073-93.
29. Cady K. Intrarater and integrated reliability of the Modified Thomas Test, *Journal of Bodywork and movement therapies*, 2022, 29.
30. Young-Mo Kim, Sung-Min Ha. Reliability of the Modified Thomas test using a lumbopelvic stabilization, *Journal of Physical Therapy Science*,2015;27:447-449.
31. Luca Longoni, Roberto Burnati. Smartphone applications validated for joint angle measurement: a systematic review, *International Journal of Rehabilitation Research*,2019;42(1):11-19(9).