ISSN 2791-156X
Journal of Health and Rehabilitation Research (JHRR)

Vol. 3, Issue 2

Original Article

Assessing the Efficacy of Pressure Algometry in Lower Back Pain: A Comparative Study of Muscle Energy Technique and Dry Needling on Active Trigger Points of Quadratus Lumborum

Komal Ahmed[1]*, Ghazal Hussain[1], Hafsa Khan[1], Hamna Zahid[2], Amena Batool[3]

[1]University of Management & Technology Lahore
[2]Riphah International University Lahore
[3]Institute of Rehabilitation Sciences-Sialkot
*Corresponding Author: Komal Ahmed, Lecturer; Email: ahmed.komal100@gmail.com
No conflict of interest declared | Received: 05-11-2023; Revised & Accepted: 14-11-2023; Published: 28-11-2023.
DOI: https://doi.org/10.61919/jhrr.v3i2.75

ABSTRACT

Background: The prevalence of chronic lower back pain has serious repercussions for the working population. Myofascial trigger points in the quadratus lumborum muscle are a substantial but sometimes ignored contributor to this pain. These trigger points form as a result of changing or increased muscle demands, acute or long-term strains on the lower back muscles, and so forth. Hyperirritable foci inside tense regions of hypertonic muscle tissue are what distinguish them. The well accepted manual therapy techniques such as dry needling and muscle energy method are used to deactivate trigger points and restore muscular balance to address this issue.

Objective: To determine the effects of muscle energy technique and dry needling of active trigger points of quadratus lumborum in lower back pain

Methods: There was a randomised controlled study. Based on inclusion and exclusion criteria, 24 subjects were chosen, divided into groups A and B. Digital algometer was used to measure the sensitivity of the trigger points. Group B underwent dry needling while Group A received the Muscle Energy Technique. Each patient received two sessions every week for three weeks. After the first, third, and sixth therapy sessions, the two groups were evaluated. Data was examined using SPSS version 21.

Results: Findings revealed that differences between two groups were statistically significant ($p < 0.05$) and also statistically significant difference were observed within group analysis ($p < 0.05$) with respect to pain pressure threshold.

Conclusion: The study concluded that both Dry Needling and Muscle Energy Technique on trigger points were equally effective in increase pain pressure threshold in lower back pain.

Keywords: Myofascial Trigger points, Muscle energy technique, Dry needling, Lower back pain treatment, Quadratus lumborum trigger points, Algometry assessment

INTRODUCTION

Lower back pain (LBP) is a prevalent health issue impacting a significant portion of the adult population. It not only contributes to work-related limitations and reduced employee productivity but also incurs substantial healthcare costs, estimated at approximately $30 billion annually (1, 2). Affecting 5% to 10% of adults each year and up to 90% over a lifetime, LBP is a leading cause of disability in individuals under 45 years. Among the various causes of LBP, mechanical issues are more common, often stemming from poor posture, bending, and lifting, which can lead to muscle hypertonicity and restricted motion (3).

A crucial muscle often involved in LBP is the quadratus lumborum (QL). This muscle is prone to the development of myofascial trigger points (TrPs), which are hyperirritable spots in skeletal muscles. TrPs in the QL can cause deep, aching pain, sometimes severe and radiating to the groin, greater trochanter, or outer thigh. The TrPs in the QL,

activated by strenuous activities like heavy lifting or awkward bending, are often overlooked, leading to misdiagnosis or underestimation of their impact on LBP (4).

TrPs are characterized by tenderness, referred pain, local twitch responses, and limited range of motion. The energy crisis theory by Travell and Simons provides a pathophysiological explanation for TrPs, suggesting that muscle overload at rest can lead to their development and sensitization of nociceptors in taut muscle bands (5).

The management of LBP involves various approaches, particularly focusing on the treatment of TrPs in the QL muscle. Two popular methods include dry needling (DN) and muscle energy techniques (METs). DN is a minimally invasive technique using acupuncture needles to target and deactivate TrPs, alleviating pain and muscle tension. Accurate diagnosis and a thorough understanding of anatomy are essential for effective DN treatment. METs, on the other hand, aim to restore musculoskeletal function and reduce pain through controlled muscle contractions against a therapist-applied counterforce (6). This technique can be tailored to individual needs, depending on whether the condition is acute or chronic (1, 7).

Despite their widespread use, there is limited research comparing the effectiveness of DN and METs in treating LBP caused by TrPs. This gap in knowledge is critical, as understanding the comparative efficacy of these treatments could enhance clinical practice and patient outcomes (8, 9). Studies like the one by Palm and Pyper in 2012, which compared different DN techniques, have shown significant improvements in pain and disability (10, 11). However, comprehensive studies evaluating DN and METs side-by-side are necessary to establish which approach is more beneficial in terms of pain relief, disability reduction, and improvement in lumbar spine range of motion (12, 13).

This paper highlights the need for further research to compare DN and METs in managing LBP caused by TrPs. Such studies are crucial for developing effective treatment protocols, potentially leading to fewer therapy sessions, shorter treatment durations, and improved rehabilitation outcomes (14, 15). The findings from future research will contribute significantly to the body of knowledge, helping to determine the most effective treatment strategy for LBP associated with TrPs.

MATERIAL AND METHODS

This randomized controlled trial, registered in the Iranian registry of clinical trials (IRCT20200221046566N1), was conducted to evaluate the effectiveness of two treatment approaches for mechanical lower back pain due to active trigger points in the quadratus lumborum muscle. The study was carried out at Riphah Clinic, Quaid e Azam campus Lahore, over a period of six months, following the approval from the ethical committee of RCRS & Allied Health Sciences. The sample size was determined to be 24 participants, calculated using G power software with a 5% margin of error, a power of 0.80, and an anticipated attrition rate of 10%.

Participants, ranging in age from 18 to 45 years and of both genders, were included if they experienced mechanical lower back pain for at least two months, had an MODI Score between 30% to 60%, and presented an active trigger point in the quadratus lumborum muscle (16). Individuals with anticoagulation or bleeding disorders, acute muscle trauma, infections, lumbar disc herniation, spinal deformities, or a history of spinal surgery or anticoagulation medication were excluded from the study (17).

A convenient sampling technique was employed to select participants, who were then randomly assigned to two groups, A and B, using computer-generated tables. The intervention consisted of two techniques: Muscle Energy Technique (MET) and Dry Needling. In addition to receiving common treatments such as moist heat and passive stretching of specific muscles, participants in the MET group underwent MET sessions, involving side-bending exercises while lying supine. The Dry Needling group received dry needling therapy directly on the trigger points (18).

For data collection, pain pressure thresholds were measured using an algometer, and the Numeric Pain Rating Scale and Modified Oswestry Disability Index were assessed. These measurements were taken before and after

the treatment, as well as during the third and sixth sessions. The interventions were administered six times over a three-week period, with two sessions per week (19).

Data analysis was carried out using SPSS version 21. Statistical significance was set at a p-value of 0.05. Descriptive statistics and independent t-tests were utilized for comparing measurements between and within groups. Additionally, a Mixed model ANOVA with Repeated Measure was applied to assess the variations over time. The study primarily aimed to explore the relative efficacy of Muscle Energy Technique and Dry Needling in managing mechanical lower back pain associated with active trigger points in the quadratus lumborum muscle.

RESULTS

In Table 1, the socio-demographic characteristics and baseline pain pressure thresholds of participants enrolled in a study comparing Dry Needling and Muscle Energy Technique for lower back pain are summarized. The average age of participants in the Dry Needling group (Group A) was 36.75 years with a standard deviation (SD) of 9.03, while the Muscle Energy Technique group (Group B) had an average age of 33.17 years with an SD of 7.91, resulting in a non-significant p-value of .321, indicating age distribution was similar across groups. The average height for Group A was 170 cm (SD = 5.58) and for Group B was 174.08 cm (SD = 18.92), with a p-value of .486, showing no significant difference in height. Participants in Group A had an average weight of 79.59 kg (SD = 15.38) compared to Group B's average of 90.08 kg (SD = 19.65), with a p-value of .160, suggesting no significant weight difference between groups. The Body Mass Index (BMI) for Group A was 27.50 (SD = 6.13) and for Group B was 29.60 (SD = 4.25), with a p-value of .341, indicating no significant difference in BMI. The baseline pain pressure threshold was similar between the two groups, with Group A having a mean of 18.25 N/cm² (SD = 3.28) and Group B having a mean of 18 N/cm² (SD = 2.18), yielding a p-value of 0.83.

Table 1 Socio-Demographic Variables and Baseline Measurements

Variables/Outcomes	Group A (Dry Needling, N=12)	Group B (Muscle Energy Technique, N=12)	P-Value
Socio-Demographic Variables			
Age of Participants (years)	36.75 ± 9.03	33.17 ± 7.91	.321
Height (cm)	170 ± 5.58	174.08 ± 18.92	.486
Weight (kg)	79.59 ± 15.38	90.08 ± 19.65	.160
Body Mass Index (BMI)	27.50 ± 6.13	29.60 ± 4.25	.341
Baseline Measurements			
Pain Pressure Threshold (N/cm²)	18.25 ± 3.28	18 ± 2.18	0.83

Table 2 presents a comparison of pain pressure thresholds (PPT) at different treatment intervals. At the first visit, the mean PPT for the Dry Needling group was 23.41 N/cm² (SD = 3.24) and for the Muscle Energy Technique group was 22.59 N/cm² (SD = 2.02), with a p-value of .82, indicating no significant difference at the start of the treatment. However, by the third visit, a significant difference emerged; the Dry Needling group's mean PPT increased to 31.92 N/cm² (SD = 2.11), while the Muscle Energy Technique group's mean PPT was 29.26 N/cm² (SD = 1.48), with a p-value of .002. This trend continued and was more pronounced by the sixth visit, where the Dry Needling group's mean PPT was 45.17 N/cm² (SD = 2.41) compared to the Muscle Energy Technique group's mean PPT of 37.75 N/cm² (SD = 1.91), with a highly significant p-value of .00, suggesting a substantial difference in effectiveness in favor of the Dry Needling group over time.

Table 2 Between Group Comparison of Pain Pressure Threshold (PPT)

Visit/Treatment Group	Dry Needling (Mean±SD, N=12)	Muscle Energy Technique (Mean±SD, N=12)	P-Value
First Visit	23.41 ± 3.24	22.59 ± 2.02	.82

Third Visit	31.92 ± 2.11	29.26 ± 1.48	.002
Sixth Visit	45.17 ± 2.41	37.75 ± 1.91	.00

*SD = Standard Deviation

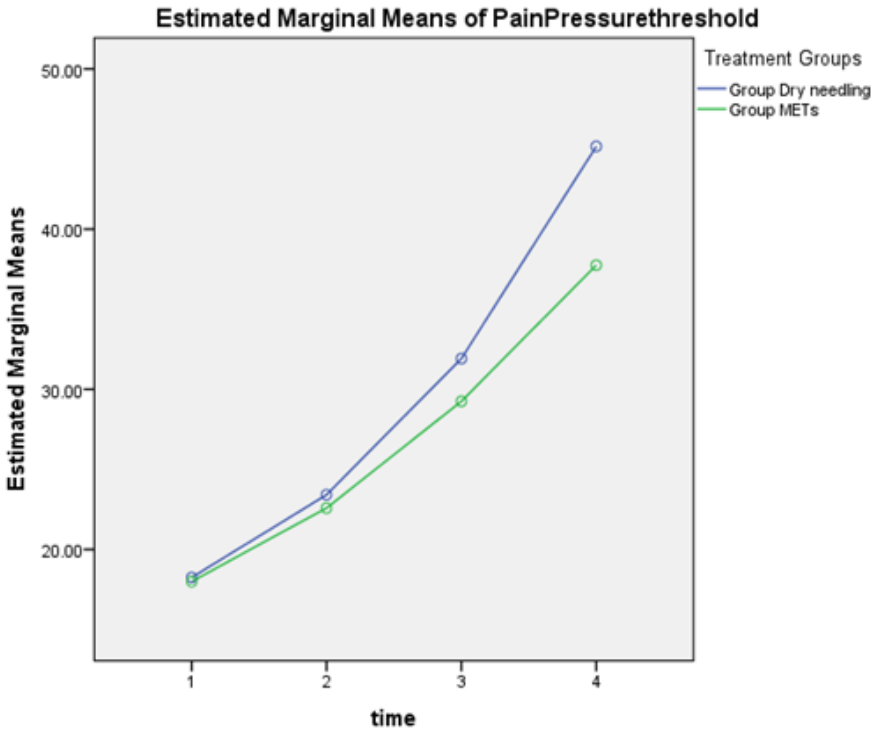

Figure 1 Comparative Line Graph

The line graph presents a comparison of the pain pressure thresholds over four time points between two treatment groups, Dry Needling (blue line) and Muscle Energy Techniques (METs, green line). Initially, both groups start with similar thresholds, but as time progresses, the Dry Needling group shows a steeper increase, suggesting a greater improvement in pain tolerance compared to the METs group by the final time point.

DISCUSSION

The study's central objective was to explore the longitudinal effects of dry needling (DN) and Muscle Energy Techniques (METs) on pain pressure threshold (PPT) in patients with lower back pain attributed to active trigger points in the quadratus lumborum muscle. A randomized controlled trial comprising 24 participants—12 receiving DN and 12 undergoing METs—was conducted over a 3-week period. Each group received treatments twice a week, each session lasting an hour, under the direct supervision of the researcher. n.

To determine within and between-group differences in PPT, repeated measures ANOVA was employed. The results, indicating a p-value of less than 0.05, supported the hypothesis that DN is more effective than METs for this particular condition. This aligns with the "energy crisis" theory of trigger points, where muscle overload and the absence of motor unit action potentials during rest in taut bands lead to the activation of trigger points and sensitization of nociceptors.

The study's findings corroborate the substantial body of research underscoring the positive impact of manual therapies on musculoskeletal disorders. DN, specifically, showed superior improvement in PPT with mean values of 45.17±2.4N/cm², compared to the METs group, which showed mean values of 37.75±1.91N/cm². This improvement is consistent with previous studies that have compared different manual therapies and found DN to be particularly effective.

The application of METs is theorized to enhance myofascial tissue extensibility, thereby affecting its viscoelastic properties and altering extracellular fluid dynamics. This could increase fluid drainage and promote hypoalgesia within the muscle. The present study's results are in harmony with those of a randomized controlled trial by Joshua Greenberg, which also supported the effectiveness of DN over post-isometric relaxation techniques (20, 21).

Despite the promising outcomes, the study faced limitations such as the lack of an immediate post-intervention assessment and the absence of categorization of the effects based on the chronicity of the condition. Future research should consider including an independent assessor to mitigate potential biases, follow up with participants to evaluate the long-term effects of treatments, and expand the sample size and variety of settings. Differentiating between acute and chronic conditions could further refine the efficacy of treatment protocols.

CONCLUSION

In conclusion, the study establishes both DN and METs as effective interventions for enhancing PPT in patients with lower back pain due to quadratus lumborum trigger points. While both treatments significantly reduced pain and functional disability, DN was found to be more effective according to the mean differences observed. The implications of this study suggest that for patients with myofascial pain syndromes, particularly involving the quadratus lumborum, DN could be considered as a preferred treatment option. This research adds to the growing evidence that supports the integration of DN into clinical practice for the management of musculoskeletal pain, particularly in the lower back.

REFERENCES

1. Tahir S, Akram S, Khan MYA, Taufiq A, Iqbal A, Anwar N. Comparative Effects of Stabilization Exercises and Muscle Energy Techniques on Pain and Disability in Patients with Sacroiliac Joint Pain. Polio Eradication from Pakistan. 2022;33(11):124.

2. da Silva T, Mills K, Brown BT, Pocovi N, de Campos T, Maher C, et al. Recurrence of low back pain is common: a prospective inception cohort study. Journal of physiotherapy. 2019;65(3):159-65.

3. Wang L, Pan Y, Ye X, Zhu Y, Lian Y, Zhang H, et al. Perirenal fat thickness and liver fat fraction are independent predictors of MetS in adults with overweight and obesity suspected with NAFLD: a retrospective study. Diabetology & Metabolic Syndrome. 2023;15(1):56.

4. Pourahmadi M, reza Ayoubpour M, Firouze B. The effect of dry needling compared to lumbar spine mobilization on functional disability, pain, quadratus lumborum and lumbar multifidus function, lumbar range of motion and pain pressure threshold in patients with non-specific chronic low back pain: Study protocol for a randomized controlled trial. 2023.

5. Al Matif S, Alfageer G, ALNasser N, Alabbas G, Al Sawidan H, ALhareth H. Effectiveness of muscle energy technique on pain intensity and disability in chronic low back patients: a systematic review. Bulletin of Faculty of Physical Therapy. 2023;28(1):24.

6. Naransammy S. Dry needling versus intramuscular electrical stimulation on deltoid myofascial trigger points: University of Johannesburg (South Africa); 2019.

7. Sirh S-J, Sirh S-W, Mun H-Y, Sirh H-M. Importance of quadratus lumborum muscle trigger point injection and prolotherapy technique for lower back and buttock pain. Frontiers in Pain Research. 2022;3:997645.

8. Nugraha MHS, Antari N, Saraswati N. The efficacy of muscle energy technique in individuals with mechanical neck pain: a systematic review. Sport Fit J. 2020;8:91-8.

9. Funk MF, Frisina-Deyo AJ. Dry needling for spine related disorders: a scoping review. Chiropractic & Manual Therapies. 2020;28(1):1-13.

10. Palm B. Comparing the effectiveness of static myofascial dry needling versus fanning dry needling in the treatment of trapezius myofascial pain syndrome: University of Johannesburg (South Africa); 2012.

11. Montgomery RC. Static versus dynamic dry needling and the physiological response on local skin temperature due to changes in local blood flow: University of Johannesburg (South Africa); 2018.

12. Mirzaie H, Pourahmadi MR, reza Ayoubpour M. The effect of dry needling compared to lumbar spine mobilization on pain, functional disability, quadratus lumborum and lumbar multifidus function, lumbar range of motion and pain pressure threshold in patients with non-specific chronic low back pain: Study protocol for a randomized controlled trial. 2022.

13. Akhtar H, Noor R, Khan AS, Saqib F, Saleem N, Waris S. Comparison of Dry Needling and Dry Cupping in Positional Fault of Pelvis Due to Myofascial Trigger Points in Quadratus Lumborum. Pakistan Journal of Medical & Health Sciences. 2022;16(05):457-.

14. Stevans JM, Delitto A, Khoja SS, Patterson CG, Smith CN, Schneider MJ, et al. Risk factors associated with transition from acute to chronic low back pain in US patients seeking primary care. JAMA network open. 2021;4(2):e2037371-e.

15. Oshikawa T, Adachi G, Akuzawa H, Okubo Y, Kaneoka K. Coordinate activity of the quadratus lumborum posterior layer, lumbar multifidus, erector spinae, and gluteus medius during single-leg forward landing. Journal of Electromyography and Kinesiology. 2021;61:102605.

16. Ahmed UA, Maharaj SS, Van Oosterwijck J. Effects of dynamic stabilization exercises and muscle energy technique on selected biopsychosocial outcomes for patients with chronic non-specific low back pain: a double-blind randomized controlled trial. Scandinavian journal of pain. 2021;21(3):495-511.

17. Porto GB, Jeffrey Wessell D, Alvarado A, Arnold PM, Buchholz AL. Anticoagulation and spine surgery. Global Spine Journal. 2020;10(1_suppl):53S-64S.

18. Nowak Z, Chęciński M, Nitecka-Buchta A, Bulanda S, Ilczuk-Rypuła D, Postek-Stefańska L, et al. Intramuscular Injections and Dry Needling within Masticatory Muscles in Management of Myofascial Pain. Systematic Review of Clinical Trials. International Journal of Environmental Research and Public Health. 2021;18(18):9552.

19. Tesch RDS, Macedo LCDSP, Fernandes FS, De Goffredo Filho GS, Goes CPDQF. Effectiveness of dry needling on the local pressure pain threshold in patients with masticatory myofascial pain. Systematic review and preliminary clinical trial. CRANIO®. 2019.

20. Greenberg J. Muscle energy technique versus dry needling of quadratus lumborum in the treatment of myofascial trigger points: University of Johannesburg (South Africa); 2014.

21. Arias-Buría JL, Martín-Saborido C, Cleland J, Koppenhaver SL, Plaza-Manzano G, Fernández-de-Las-Peñas C. Cost-effectiveness evaluation of the inclusion of dry needling into an exercise program for subacromial pain syndrome: evidence from a randomized clinical trial. Pain Medicine. 2018;19(12):2336-47.

