Journal of Health and Rehabilitation Research (JHRR)

e-ISSN 2791-156X

Comparing the Therapeutic Effects of Dry Needling and Muscle Energy Technique on Quadratus Lumborum Trigger Points: A Study on Back Pain Alleviation.

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ABSTRACT

Background: Chronic lower back pain is a prevalent health issue with substantial implications for the working population. Often overlooked, myofascial trigger points in the quadratus lumborum muscle significantly contribute to this condition. Trigger points arise due to increased or altered muscle demands and acute or chronic stresses on the lower back musculature, manifesting as hyperirritable foci within taut bands of hypertonic musculature. Muscle energy technique and dry needling are well-established manual therapy treatments aimed at deactivating trigger points and correcting muscular imbalances.

Objective: This study aimed to assess the effects of muscle energy technique and dry needling on active trigger points in the quadratus lumborum muscle for alleviating lower back pain.

Methods: A randomized controlled trial was conducted, involving 24 subjects who met the inclusion and exclusion criteria. The participants were divided into two groups: Group A received muscle energy technique, while Group B received dry needling. Pain assessment, functional evaluation, and trigger point sensitivity measurements were performed using the Numeric Pain Rating Scale (NPRS). Each patient received two treatment sessions per week for three weeks. Evaluations were conducted after the 1st, 3rd, and 6th treatment sessions, and data were analyzed using SPSS 21.

Results: The findings revealed statistically significant differences between the two groups ($p < 0.05$). Furthermore, within-group analysis demonstrated statistically significant differences ($p < 0.05$) in pain scores.

Conclusion: This study concluded that both dry needling and muscle energy technique effectively reduced pain threshold in lower back pain by targeting trigger points in the quadratus lumborum muscle.

Key words: Myofascial Trigger points, Muscle energy technique, Dry needling

Received: 06-06-2023 Revised & Accepted: 22-06-2023 Published: 10-07-2023

DOI: https://doi.org/10.61919/jhrr.v3i1.76

INTRODUCTION

Lower back pain (LBP) is a widespread health issue that significantly contributes to job-related impairment, impairing employee productivity and raising healthcare expenses. Lower back diseases are more common in those under 45 years old. At some point in their lifetimes about 60–80% of adults experience lower back pain and ninety percent of the time LBP will be mechanical in nature. Eighty-five percent of those suffering from back pain will recover within three months. However, approximately fifteen percent cannot get better (1).

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There are two main types of lower back pain; mechanical and non-mechanical. Non- mechanical lower back pain is not common and happens due to a neoplastic, infective, inflammatory, or metabolic disease of the spine. Mechanical LBP is non-specific and is frequently allied with lifting, bending, and poor posture which results in hypertonic musculature and decreased range of motion (ROM). Myofascial trigger points (TrPs) are often found in this situation. Most movements like twisting and coughing rise the pain which is relieved by resting and pain killers(2).

Soft tissues might turn shortened, contracted, weakened, lengthened, or painful. To adaptive the demands of different processes like daily activities, trauma, repetitive habits, and emotional states as well as the aging process, the human body compensates easily. When a body adaptive capabilities compromise the result is musculoskeletal dysfunction and tissues were exhausted. At this phase symptoms visible which include increased pain and limited ROM(3). Many times, physical examination, history and imaging studies are not enough to identifying the cause of pain, for specific pain generator diagnosis is always difficult(4).

A hypersensitive region with a palpable nodule in a taut band is known as a myofascial trigger point (TrP) in skeletal muscle. A painful compression site can result in autonomic symptoms, motor dysfunction, discomfort, and particular referred pain(5). Over a lifetime practically every person will experience low back pain which is caused by TrPs. Even though LBP due to myofascial TrPs is generally recognized in a clinical setting but there is still much to be discussed about their pathophysiology, machines of pain transfer, and treatment option(6).

Quadratus lumborum (QL) muscle is one of the most frequently affected by TrPs in LBP. QL has four TrPs: two superficial and two deep TrPs. Directly below the 12th rib superficial cephalic TrPs and lateral to the transverse process of the 3rd lumbar vertebra deep cephalic TrPs are located. Above the iliac crest superficial caudal TrPs and lateral to the transverse process of the 5th lumbar vertebra deep caudal TrPs are located(7).

The discomfort in the QL muscle is often deep, painful, and dull, but it can occasionally become severe during movement or spread to the upper outside part of the groyne. On occasion, the discomfort may radiate to the greater trochanter or the outside of the upper thigh.. On pressure greater trochanter feels tender, so lying on that side, patient cannot endure it(8). The QL is one of the most frequently ignored sources of LBP and often mimics more serious lower back pathology which is called the “Joker of LBP”. With awkward movements like lifting a heavy weight, bending coupled with rotation, to pick something up from the floor and by sudden trauma activates QL muscle TrPs(9).

Many techniques of treating TrPs induce low back pain have been hypothesized, the most common being acupuncture, procaine injections. Physical therapy is one of the most effective forms of treatment for myofascial TrPs. Various myofascial therapy techniques like dry needling (DN) or muscle energy technique (METs) are very effective in alleviating LBP and deactivation of myofascial TrPs. For most applicable treatment and management of TrPs yet there is no consensus in clinical practice(10).

To treat myofascial pain syndrome and related impairments dry needling (DN) is used. Also acknowledged as intramuscular stimulation, which is much safer, does not cause potential side effects of anesthetic and it is less invasive procedure in which an acupuncture needle is inserted into skin and muscle(11). This treatment procedure is commonly used to treat pain by targeting and eliminating local trigger points. If DN is performed correctly by the practitioner it is very effective for myofascial pain release and deactivation(12). Most papers support the DN for TrPs treatment. Another study conducted by Collins S, Abbay D and Daniel R. conducted on consequence of DN in 2016 at University of Nevada, Las Vegas. There results signifying that persons with back pain may not experience a physical change in resting and contracted thickness of Transverse abdominis ensuing dry needling. A significant reduction in discomfort and ODI value were seen in both groups, signifying a likely palliative influence (13, 14).

METs is a soft tissue osteopathic manipulation procedure which were intended to restore musculoskeletal (MSK) function and reduce pain. It is used to increase flexibility and strengthen of muscles, reduce local edema, enhance fluid mechanics, decrease pain, restore ROM especially in restricted joints. According to Fryer that by creating an improvement in deep segmental muscle recruitment motor control METs could stimulate joints and muscle proprioceptors and regain joint stability. To reduce TrPs sensitivity MET shown to be a safe, easy and effective procedure. If the muscle cannot easily reach to its normal resting length TrPs will re-activate. MET seems a useful means of treatment since it normal muscle resting length

and stop TrPs to re-activate. MET has developed, refined and now crosses all interdisciplinary boundaries and being commonly adopted in all clinical setting(15).

Clinical practice has shown that to acquire best therapeutic effect METS should be performed for (rep 5×2), 20-30% of the patients available strength of muscle, for (3-7) seconds. To control the involved forces Light contractions is helpful the practitioner. When contractions are not too strong patient experiences greater comfort and reduced pain. Phasic muscles were activated when a contraction go beyond 30-35 percent of available strength . To reduce muscle tone within a muscle or group of muscles, there are two physiological mechanisms in METs post-isometric relaxation and reciprocal inhibition(16).

Previous studies was performed to define which of the treatment procedures is more effective, determine possible benefits for patients as well as for therapist and which would be better suited for active quadratus lumborum TrPs. Keeping this in mind, it is dire need to find the additive effect of DN with comparison to METs with regards to pain, disability and lumbar spine ROM. It might reduce the treatment sessions and time, improve clinical practice and rehabilitation in patients with trigger point induce lower back pain. Therefore, this study will give accumulation to the growing structure of knowledge and find out that either one technique is superior or other one or both the techniques show comparable outcomes, which one should be the choice of therapy(17).

METHODOLOGY

A randomized controlled trial (RCT) was completed and entered under the reference number IRCT20200221046566N1 in the Iranian registry of clinical trials (IRCT). The Riphah Rehabilitation Centre in Lahore provided the data. After getting ethical committee approval, the study was conducted for six months. Using the G power version 3.1.9.2 programme, a sample size of 24 was chosen, taking into account a 5% margin of error, 0.80 power of the study, and the standard deviation mean from previous research.. Assuming a 10% attrition rate, 24 patients were recruited for the study. SPSS version 25 was used for data entry and analysis, employing t-tests to compare means between two independent groups. The inclusion criteria were as follows: subjects aged between 18 to 45 years, both male and female participants, individuals with mechanical lower back pain lasting at least two months with an initial MODI Score of 30%-60%, and the presence of an active trigger point in the quadratus lumborum muscle according to Travell and Simons diagnostic criteria. Acute muscular injuries, localised or systemic infections, lumbar disc herniation, spinal abnormalities, any prior history of spinal surgery, anticoagulant use, and bleeding disorders were among the exclusion criteria. The data were gathered using a practical sampling approach.

The study utilized the Numerical Pain Rating Scale (NPRS) to evaluate the severity of pain reported by participants on a scale from 0 to 10. Random assignment was employed to allocate the 24 recruited patients into two groups: Group A and Group B. Group A received Muscle Energy Techniques (METs), which involved a series of controlled movements and contractions to address the trigger points in the quadratus lumborum muscle. On the other hand, Group B underwent dry needling, where thin needles were inserted into the trigger points to release tension and alleviate pain. Both groups received a total of six treatment sessions over a three-week period, with assessments conducted before and after each session. To minimize post-needling complications, participants in both groups were provided with follow-up instructions, including rest, hydration, and the application of ice if necessary. By employing these treatment approaches and evaluating pain outcomes using the NPRS, the study aimed to uncover the effectiveness of muscle energy technique and dry needling in reducing pain associated with quadratus lumborum trigger points and ultimately alleviating lower back pain.

The data was analyzed using SPSS 21, with a predetermined statistical significance level of $P = 0.05$. The normality of the data was assessed using the Shapiro-Wilk test to determine whether parametric tests should be used within or between groups. The analysis included the following tests: descriptive statistics, which involved using histograms and cluster bar charts to provide a summary of group measurements over time. Additionally, an independent t-test was employed to compare different levels between two groups. Changes both within and between groups were analyzed using a mixed model ANOVA with repeated measures, which is a parametric test.

RESULTS

The study included a total of 24 participants who met the inclusion criteria and were allocated to either the dry needling group or the Muscle Energy Techniques (METs) group. Baseline characteristics, including age, weight,

height, and BMI, were comparable between the two groups. The Numeric Pain Rating Scale (NPRS) scores at baseline were similar in both groups.

Using independent sample t-tests, comparisons were done between the groups at the first, third, and sixth treatment sessions. At the first and third visits, there were no statistically significant differences ($p > 0.05$), but at the sixth visit, there was a statistically significant difference (p 0.05), showing that the dry needling group had significantly less pain than the METs group.

Regarding pain pressure thresholds, there was no statistically significant difference ($p > 0.05$) between the groups at the 1st visit, but statistically significant differences ($p < 0.05$) were observed at the 3rd and 6th visits. The dry needling group demonstrated greater improvement in pain pressure thresholds compared to the METs group at the 6th treatment session.

Overall, the study concluded that both dry needling and METs were equally effective in reducing pain in patients with lower back pain (LBP) and active trigger points in the quadratus lumborum muscle. However, the outcomes of dry needling were found to be better than METs in terms of pain reduction.

Table 1 Comparison of Socio-Demographic Variables of two Groups

Study Group		Mean	Std. Deviation	P-Value
Group A Dry Needling N=12	Age of Participants	36.75	9.03	.321
	Height in cm	170	5.58	481
	Weight in kg	79.59	15.38	.159
	Body Mass Index Participants	27.50	6.13	.340
Group B Muscle Energy Technique N=12	Age of Participants	33.17	7.91	.321
	Height in cm	174.08	18.92	.486
	Weight in kg	90.08	19.65	.160
	Body Mass Index (BMI) of Participants	29.60	4.25	.341

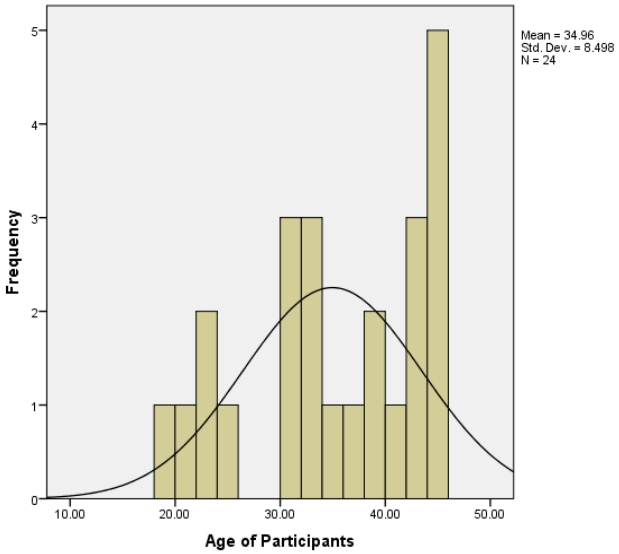

Figure 1Histogram of Age

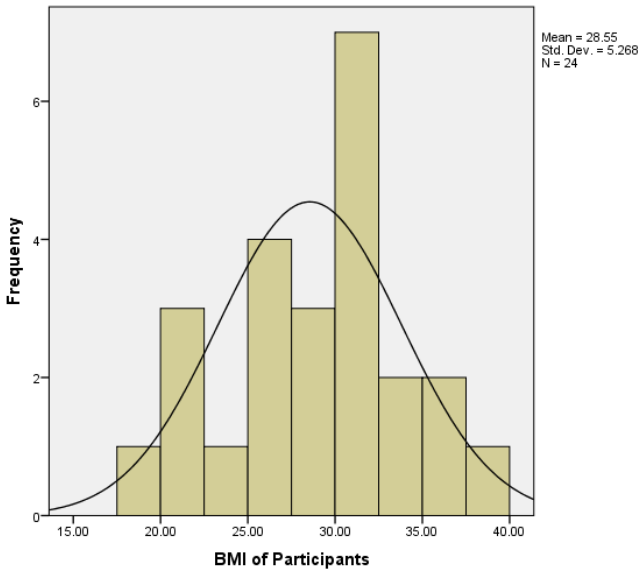

Figure 2Histogram of Body Mass Index (BMI)

Table 2 Base line measurement for NPRS

Outcomes	Group A Dry Needling (n=12)	Group B Muscle Energy Technique (n=12)	P value
	Mean ± SD	Mean ± SD	
Numeric Pain Rating Scale	7.75±0.87	7.92±0.99	0.66

Table 3 between Group Comparisons of Numeric Pain Rating Scale

Outcome		Treatment group		P value
		Dry needling (n=12)	Muscle Energy Technique (n=12)	
NPRS	Frist visit (Mean±SD)	6.50±0.91	6.67±0.99	0.67
	Third visit (Mean±SD)	3.76±0.87	4.67±0.66	0.19
	Sixth visit (Mean±SD)	1.34±0.98	3.09±1.25	0.01

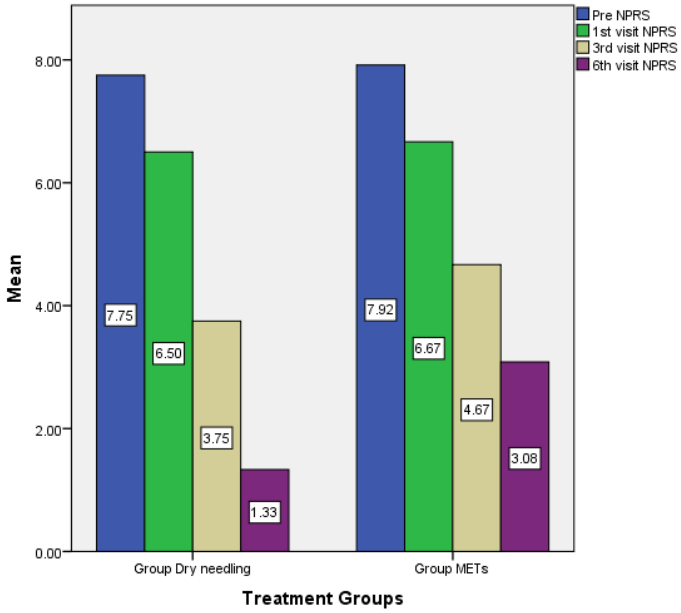

Figure 3 Clustered Bar Chart of NPRS Score

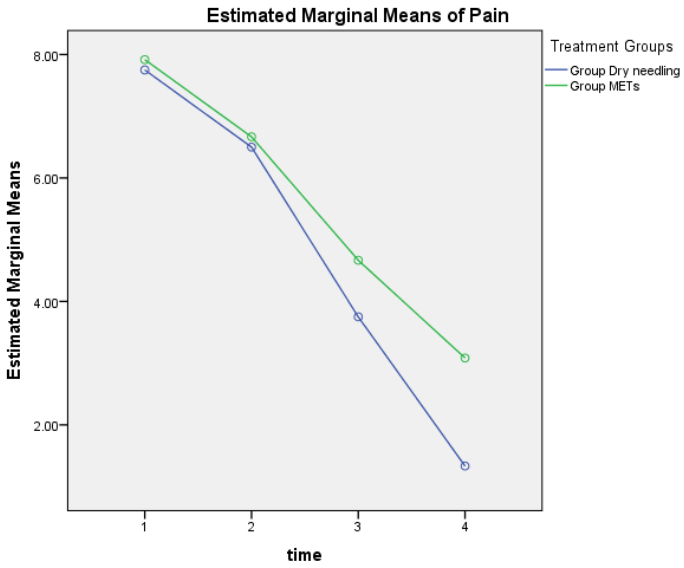

Figure 4 Shows the Estimated Marginal means of Pain Pre, 1st, 3rd & 6th among Dry needling and Muscle energy technique Group

DISCUSSION

The discussion of the study focused on the effects of dry needling and Muscle Energy Techniques (METs) on active trigger points of the quadratus lumborum muscle in patients with lower back pain (LBP). The study utilized a randomized controlled trial with 24 participants, divided equally into the dry needling group and the METs group. The Numeric Pain Rating Scale (NPRS) was used to assess pain levels before and after treatment sessions.

The results showed that both dry needling and METs were effective in reducing pain in LBP patients with active trigger points. However, the dry needling group demonstrated greater improvement in pain reduction compared to the METs group. This finding supports previous studies that have shown the effectiveness of dry needling in myofascial pain release(9).

The trigger points in the quadratus lumborum muscle were identified as a commonly overlooked source of lower back pain, often mimicking more serious back pathologies. The study also discussed the energy crisis theory, which provides a pathophysiological explanation for trigger points, emphasizing the role of muscle overload and sensitization of nociceptors(18).

The discussion highlighted the significant statistical differences between the two treatment groups, with both interventions leading to pain reduction. The invasive nature of dry needling was noted, with the needle mechanically interrupting dysfunctional motor end plates. Similar studies have reported significant results between physical therapy treatment and dry needling, supporting the findings of the current study(19).

The discussion also touched upon the effects of METs on myofascial tissue extensibility, viscoelasticity, and fluid dynamics within muscles. The results showed that both dry needling and METs had statistically significant differences in post-treatment NPRS scores and pain pressure threshold (PPT) scores between group analyses. These findings align with other studies conducted on trigger points of the quadratus lumborum, supporting the effectiveness of both interventions(20).

Overall, the study concluded that both dry needling and METs were effective in reducing pain in LBP patients with active trigger points. However, dry needling showed greater improvement in pain reduction. The study contributes to the existing body of research on physiotherapy treatments for trigger points and highlights the potential benefits of incorporating dry needling into treatment approaches.

LIMITATIONS & RECOMMENDATIONS

The study concluded that both Dry Needling and Muscle Energy Technique were effective in reducing pain, functional disability, and increasing pain pressure threshold in patients with lower back pain. The Dry Needling group showed greater improvements than the Muscle Energy group. Limitations of the study include the inability to document immediate effects and the lack of categorization based on chronicity. Recommendations include conducting long-term follow-up sessions, larger sample sizes, diverse study settings, and exploring optimal treatment protocols for different types of trigger points. Additionally, investigating the effects of longer rest periods between dry needling sessions and considering post-needling soreness reduction strategies is suggested.

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