Efficacy of PEMF and myofascial release Vs laser and nerve glide techniques in case of lumbar fibromyalgia

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***Abstract*—INTRODUCTION: Chronic non-specific low back pain is a major worldwide condition that has severe emotional, social, and economic consequences. Management is difficult, requiring the development of new, effective, and safe approaches.**
OBJECTIVES: This study was conducted to examine the effects of PEMF) and myofascial release Vs Laser and nerve glide on pain, functional disability in patients with lumbar fibromyalgia.
MATERIALS AND METHODS: Participants (n = 80) with lumbar fibromyalgia were randomised into two groups; Group A: PEMF & myofascial release, Group B: laser & nerve glide. The interventions were given daily for 4 weeks. The outcomes were pain, disability index, hamstring tightness measured at day0 and after 4 weeks.
RESULTS: The result suggested a both the group improvements in all parameters. However, a typical significant improvement in functional disability was observed after the 4th week between group comparisons. The maximum improvement was seen in group A followed by group B.
CONCLUSION: It can be concluded that PEMF and myofascial release techniques in combination significantly decrease pain, disability, and hamstring tightness patients with lumbar fibromyalgia.

***Index Terms*—lumbar fibromyalgia, pemf, myofascial release, laser, nerve glide**

I. Introduction

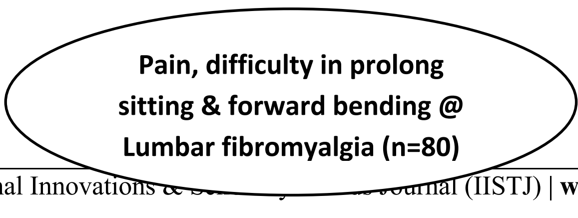
Low back pain (LBP) is a highly prevalent musculoskeletal condition that significantly affects quality of life and functional ability across diverse populations. It is characterized by discomfort localized to the lumbar or lumbosacral region, with or without radiating pain to the lower extremities, and may arise from various underlying causes. Chronic low back pain, typically defined as pain persisting for more than 12 weeks, often continues beyond the resolution of the initial tissue injury and is associated with complex biopsychosocial factors, including muscle weakness, limited mobility, and psychological distress(1). Low back pain typically occurs due to exposure to stress or strain to lower back muscles, tendons, and ligaments. Mechanical low back pain is chronic pain of varying intensity, often affects the lower part of the spine, and radiates to the gluteal region. During the day, the severity of pain increases by daily activities such as bending forward, turning, lifting weights, standing, or sitting for a long period. To characterize low back pain as mechanically induced, other etiologies such as inflammatory, infectious, tumoral, metabolic causes, and referred pain from visceral organs should be excluded (2). Most low back pain is may be due to repetitive strain injuries, not the result of a single exposure to a high magnitude load, but instead due to cumulative trauma from sub-failure-magnitude loads like repeated small loads (e.g., bending) or a sustained load (e.g., sitting). Low back injury results from repetitive motion at end range as a result of a history of excessive loading which gradually, but progressively, reduces the tissue failure tolerance(11). PEMF therapy is another therapeutic option frequently applied in knee, hip, and spine osteoarthritis treatment. The PEMF showed a beneficial tendency on the bone growth stimulation in acute fractures and efficient in relieving pain and enhancing bone formation in osteoporosis. Magnetic field therapy enhances local cellular activity, oxygen consumption in the tissue, and vasodilation without increasing local temperature. Despite a great number of clinical studies, the efficacy of the methods has not been proved (3,4). Laser therapy, also known as photobiomodulation, has gained attention due to its potential to modulate pain and enhance tissue repair. This therapy uses specific wavelengths of light to stimulate biological responses at the cellular and tissue levels. Laser therapy is typically classified into Low Level Laser Therapy (LLLT) and High-Intensity Laser Therapy (HILT), based on the power output and depth of penetration. Both modalities have been used to treat orthopedic conditions, but their mechanisms of action and clinical applications differ significantly. LLLT operates mainly through photochemical and gap in the literature regarding the optimal use of laser therapy in this context. Therefore, the present systematic review aims to synthesize the available evidence on the effectiveness of high- and low-level laser therapies in reducing pain and improving function in adults with orthopedic pain. The primary objective is to compare clinical outcomes such as pain intensity and functional recovery between the two laser modalities. A secondary objective is to assess their impact on quality of life and report any adverse effects associated with their use. This review intends to provide clinicians with clearer, evidence-based guidance for selecting the most appropriate laser therapy modality in orthopedic care. photophysical mechanisms, modulating mitochondrial activity to increase ATP production, reduce oxidative stress, and influence the expression of inflammatory cytokines. These effects contribute to decreased pain perception, enhanced local circulation, and accelerated tissue regeneration. LLLT is generally applied for superficial musculoskeletal conditions, such as tendinitis, plantar fasciitis, and early-stage osteoarthritis. Conversely, HILT combines photochemical effects with controlled thermal action, which promotes vasodilation, deep tissue penetration, and neuromuscular relaxation. Its higher output enables therapeutic effects at greater tissue depths, making it suitable for treating more complex or deep-seated conditions such as chronic low back pain, muscle spasms, and post-surgical musculoskeletal pain(5,6). Myofascial stretching targets the fascial sheathes that surround and interconnect the whole body along various chains. Using this technique we can stretch not only local fascia but also fascial structures that interact with the target muscle from a distant parts of the body. So we can treat myofascial tension more effectively than conventional stretching methods. The use of myofascial stretching in physiotherapy can reduce hyper-activation of muscle fibers and restore normal muscle length based on the concept of the whole-body fascial and myofascial linkages. Using this technique trigger points could be treated. This is also a good way of self-treatment because it does not require a therapist. But in some pain problems and acute state it can’t be used(7,8,9). Neural tissue mobilization is passive and applied by the therapist to decrease mechanical stress. Mobilization of peripheral nerves will improve the efficiency of nerve conduction i.e (sciatic nerve glide, slump nerve glide, SLR nural slider, femoral nerve glide). Exercise for nural glide helps to maintain spinal stability and reduction of pain (10). No any studies have explored the comparative response to PEMF with MFR and Laser with neural mobilization. Therefore, this study compares the out-comes in terms of pain relief and perceived level of mobility in patients with lumbar fibromyalgia, regardless of whether the neural mobilization technique or MFR therapy is used. The aim of the study was to use of such interventions were how far effective in pain as well as functional status. The objectives are, whether any significance seen in between the interventions or not.

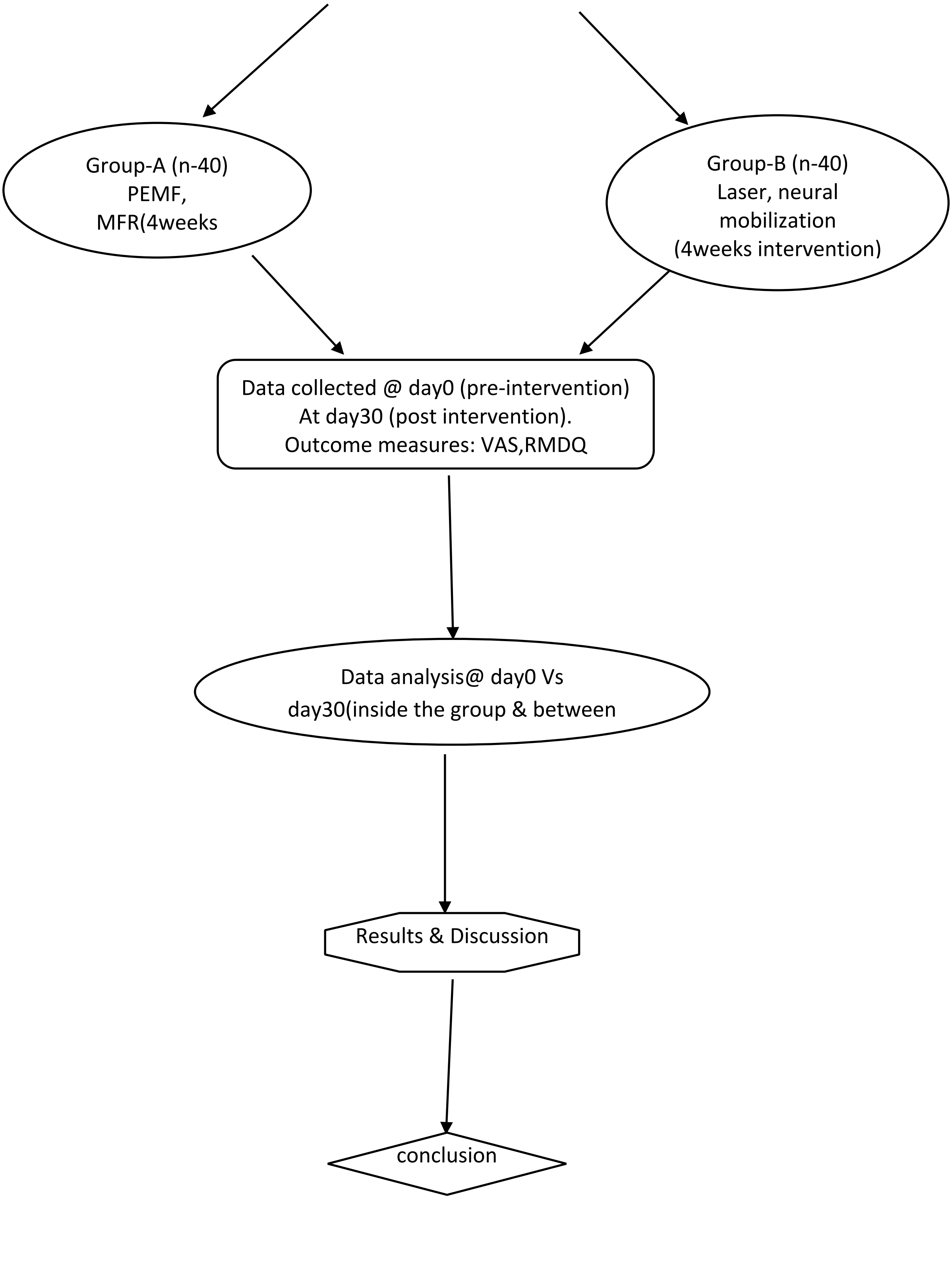
II. Materials & Methods

Study design and setting: This research was planned as a prospective, randomized, single-blind study. The study was performed between March 2025 and Feb 2026 following the Clinical Research Ethics at ANS Hospital (Jaipur), 80 participants were recruited from Dept. of Physical Therapy and Rehabilitation. All participants signed a written informed consent before being enrolled in this study. All the subjects who were diagnosed with chronic low back pain from various OPD, were referred to physiotherapy department and was screened and assessed according to inclusion and exclusion criteria. The eligible subjects were approached with proposal of the study, written informed consent was taken from them in their preferred language. All the participants were assigned into two groups for 4 weeks of interventions. Group-A provided with PEMF with myofascial release techniques and Group-B provided with Laser with neural mobilization techniques. Both the groups having equal nos of participants (n=40). **Inclusion criteria:** diagnosed as lumbar fibromyalgia (pain persists longer than 6 weeks), age between 30-60 yrs, Pain on forward bending and prolong sitting. **Exclusion criteria:** Subjects with neurological deficits in their lower extremities, osteoporosis, malignancy, surgery to the lumbar region, any significant pathology in lower back region.

Outcome measures: Visual analogue scale (VAS): (Klimek et al.,2017)Pain severity was assessed using a 10-cm horizontal visual analogue scale, with the left end point labeled ‘no pain’ and the right endpoint labeled ‘worst pain’. This method is recognized for its simplicity,validity,and reliability in pain assessment. Participants were asked to mark the point on the line that best represented their level of pain. The Two groups recorded their pain before and after treatment on this scale. Roland-Morris Disability Questionnaire (RMDQ): This questionnaire was developed to evaluate the physical disabilities caused by low back pain. In this questionnaire consisting of 24 sentences about functional disabilities, patients are asked to respond “yes” if the sentence fits their situation and “no” if it doesn’t. Each “yes” answer is counted to calculate the total score, between 0-24, with a higher score indicating more disability(12).

Techniques of data collection: Initial assessment was taken on the first day of intervention by using outcome measures and final assessment was taken on 30th day using same outcome measures. Comparison done with pretest and posttest values within and between the groups. **Data analysis & interpretation**: Data collected from subjects were analyzed using paired "t"test to measure changes between pretest and post test values of outcome measures within the technique. Independent, "t" test was used to measure changes between the techniques. The analysis was performed using JASP software, 16th version. Mean, variance, standard deviation, 95% of confidential interval ($p< 0.05$). **Treatment protocol:** PEMF therapy: The therapy was administered with a PEMF machine at a frequency of 50 Hz and an intensity of 25 G for 10 minutes. Myofascial release: the special kinds of soft tissue stretch techniques performed for 10 mins with elbow and thumb glide i.e (Thoracolumbar Fascia Release, Quadratus Lumborum fascia release, Lumbar Paraspinal Cross-Hand Release, Iliopsoas fascia release, Piriformis fascia release, Hamstring fascia Release). Laser: The HILT emitted a double wave length (850 nm) at a power of 3.2 Watt (W) and energy density of 5 Joule/cm^2, was used for 10 mins. Neural mobilization: special kind of mobilization by means neural tension released, performed for 10 mins i.e (femoral nerve glide, seated slump nerve glide, supine slider, SLR neural slider).





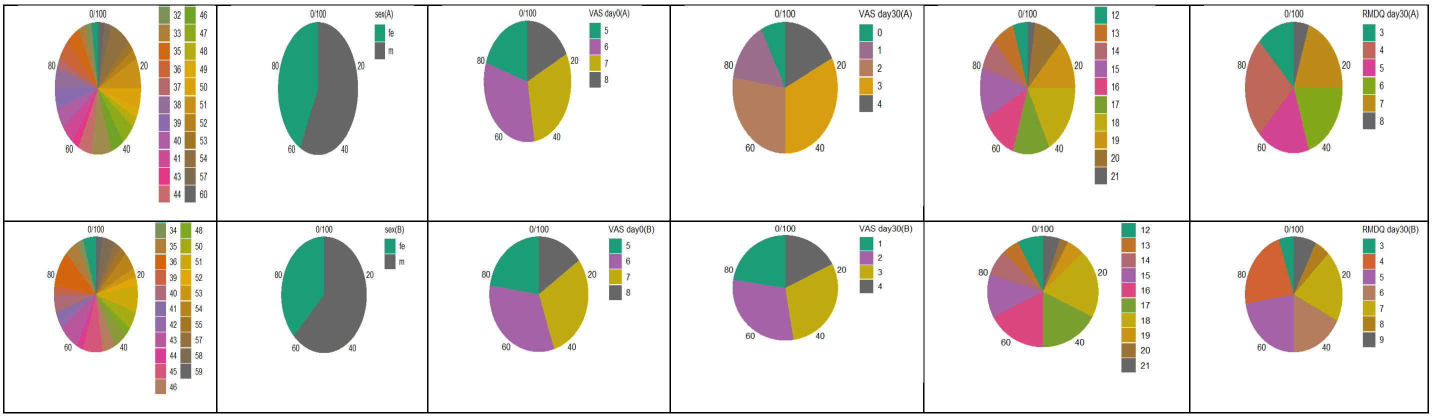
Group-A (n-40)
PEMF,
MFR(4weeks
Group-B (n-40)
Laser, neural
mobilization
(4weeks intervention)
Data collected @ day0 (pre-intervention)
At day30 (post intervention).
Outcome measures: VAS,RMDQ
Data analysis@ day0 Vs
day30(inside the group & between
Results & Discussion
conclusion

III. Result

Descriptive Statistics

	age(A)	age(B)	sex(A)	sex(B)	VAS day0(A)	VAS day0(B)	VAS day30(A)	VAS day30(B)	RMDQ day0(A)	RMDQ day0(B)	RMDQ day30(A)	RMDQ day30(B)
Valid	40	40	40	40	40	40	40	40	40	40	40	40
Missing	0	0	0	0	0	0	0	0	0	0	0	0
Mean	44.400	45.125			6.450	6.375	2.375	2.425	16.675	16.350	5.250	5.700
Std. Error of Mean	1.167	1.253			0.160	0.159	0.185	0.164	0.380	0.359	0.234	0.256
Std. Deviation	7.383	7.923			1.011	1.005	1.170	1.035	2.401	2.271	1.481	1.620
Variance	54.503	62.779			1.023	1.010	1.369	1.071	5.763	5.156	2.192	2.626
Range	30.000	29.000			3.000	3.000	4.000	3.000	9.000	9.000	5.000	6.000
Minimum	30.000	30.000			5.000	5.000	0.000	1.000	12.000	12.000	3.000	3.000
Maximum	60.000	59.000			8.000	8.000	4.000	4.000	21.000	21.000	8.000	9.000

Pie charts

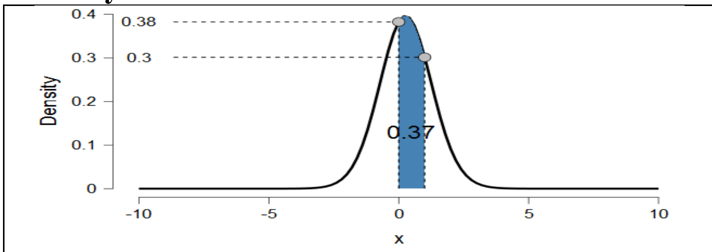


Paired Samples T-Test

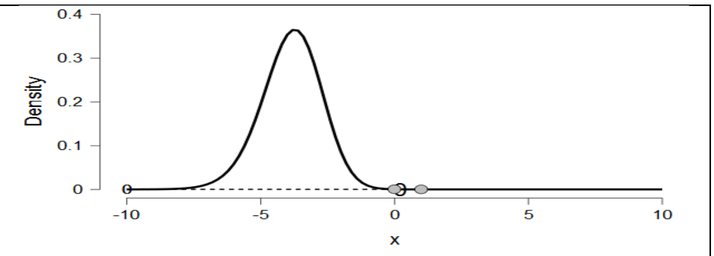
Measure 1		Measure 2	t	df	p	Mean Difference	SE Difference	95% CI for Mean Difference Lower	95% CI for Mean Difference Upper	Cohen's d	95% CI for Cohen's d Lower	95% CI for Cohen's d Upper
age(A)	-	age(B)	0.819	39	0.418	-0.725	0.885	-2.515	1.065	-0.130	-0.440	0.183
VAS day0(A)	-	VAS day0(B)	0.534	39	0.596	0.075	0.140	-0.209	0.359	0.084	-0.227	0.394
VAS day30(A)	-	VAS day30(B)	0.269	39	0.041	-0.050	0.186	-0.426	0.326	-0.043	-0.352	0.268
RMDQ day0(A)	-	RMDQ day0(B)	1.362	39	0.181	0.325	0.239	-0.158	0.808	0.215	-0.099	0.528
RMDQ day30(A)	-	RMDQ day30(B)	3.798	39	0.032	-0.450	0.118	-0.690	-0.210	-0.601	-0.934	-0.260

Above study shows the significance of "P" in both pain and functional status through out laser and myofascial release. "P"= 0.041 for pain significance and "P"= 0.032 for functional status.

Density Plot



VAS significants



RMDQ significant

IV. Discussion

PEMF with Myofascial Release: This combination targets neuromodulation (PEMF) and soft-tissue dysfunction (myofascial release)—two different aspects of pain and dysfunction in fibromyalgia.

PEMF: Some controlled trials show PEMF can significantly reduce pain scores (VAS), widespread pain index, and symptom severity compared to other treatment in fibromyalgia populations. Larger studies with standardized devices reported no significant difference compared to other methods for pain or function. PEMF may influence microcirculation, neuronal membrane potential, and central pain processing—potentially relevant to central sensitization in fibromyalgia.

Myofascial Release: Multiple randomized trials and meta-analyses report that therapist-administered or self-myofascial release significantly reduces pain, improves sleep quality, and enhances quality of life compared to control/sham approaches in fibromyalgia. One RCT showed that myofascial release reduced pain intensity and overall health status more than passive stretching or control. By reducing myofascial tightness and soft-tissue restrictions, this technique may decrease nociceptive input from fascia/muscles, indirectly attenuating central sensitization.

Overally combination of both procedure may produce additive benefits, particularly for pain reduction, stiffness, fatigue, and quality of life. The strongest evidence in fibromyalgia is for myofascial release techniques, while PEMF's benefit appears variable and dependent on device/protocol.

Low-Level Laser Therapy (Photobiomodulation): Some pilot and small studies suggest potential symptom improvement, but high-quality RCTs are scarce. Evidence from broader musculoskeletal pain populations shows laser may reduce inflammation and pain, but fibromyalgia-specific data remains low.

Nerve Glides Techniques: Evidence in fibromyalgia exists but is modest: A randomized trial showed that neurodynamic mobilization improved pain, neurodynamic testing outcomes, functional status, and fatigue versus a control group. Nerve glides aim to normalize tension, promote axonal mobility, and reduce mechanosensitivity, which may benefit patients with nerve mechanosensitivity or mixed central/peripheral symptoms.

Overally both techniques promotes tissue/biochemical modulation approach (laser) with neuro-mechanical modulation (nerve glides). While laser evidence is limited in fibromyalgia, nerve glides have some supportive RCT evidence for symptom reduction.

Interpretation: Myofascial release has the strongest and most consistent evidence among manual and physical modalities for fibromyalgia symptom reduction. PEMF may offer additional benefit, but it's not consistently superior to placebo/sham in large trials. Nerve glides can improve neurodynamic discomfort and pain, particularly where nerve mechanosensitivity is a component of symptoms. Laser therapy remains promising but under-investigated in fibromyalgia and its specific benefit over other modalities is not well established.

Conclusion: PEMF with myofascial release generally shows consistent moderate efficacy, especially myofascial release for pain, function, and quality of life in fibromyalgia. However Laser with nerve glides have some supportive evidence, particularly for neurodynamic improvements, but laser evidence is less established in fibromyalgia. Further more group-A having a significant outcomes than grup-B.

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