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To Compare the Effect of Extracorporeal Shock Wave Therapy Versus High Intensity Laser Therapy with Mulligan Mobilization in the Reduction of Chronic Low Back Pain with Sacroiliitis

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Abstract: ***Background: Sacroiliac joint dysfunction (SIJD) and chronic low back pain (CLBP) are common musculoskeletal conditions that cause pain, functional limitations, and a lower quality of life. To treat this sacroiliitis, a variety of physiotherapy techniques are employed. Such as Mulligan Mobilization, Laser Therapy, and Extracorporeal Shock Wave Therapy (ESWT). Objective: To compare the effectiveness of extracorporeal shock wave therapy versus laser therapy with Mulligan mobilization in the reduction of pain, muscular strength, and to improve the functional ability in patient with sacroiliitis. Methods: Sixty people associated with chronic low back pain along with sacroiliitis were included in a comparative experimental study. In between sixty individual each were divided into two groups randomly: Group A received extracorporeal shock wave therapy with mulligan mobilization (ESWT + Mulligan Mobilization) and Group B received laser therapy with mulligan mobilization (LT + Mulligan Mobilization). Pressure Pain Threshold (Pain Algometer), Visual Analog Scale (VAS), Manual Muscle Testing (MMT), and Oswestry Disability Index (ODI) were the most common outcome measurements in patients associated with chronic low back pain along with sacroiliitis. Pre, and post-treatment evaluations were conducted in patient associated with chronic low back pain along with sacroiliitis. SPSS version 26.0 was used to analyse the data. Results: Across all evaluation periods, both groups showed statistically significant improvements in pain, muscle strength, and functional impairment ($p < 0.05$). However, at the post-treatment interval, Group A significantly outperformed Group B in terms of pain threshold, VAS scores, MMT scores, and ODI, with large effect sizes. Conclusion: In patient associated with chronic low back pain along with sacroiliitis, Extra corporeal shock wave therapy with Mulligan mobilization is more beneficial than laser therapy with Mulligan mobilization in terms of pain and disability reduction and muscular strength enhancement.***

Keywords: Sacroiliitis, Sustained natural apophyseal glide, Movement with mobilization, Mulligan mobilization, High intensity laser therapy, extracorporeal shock wave therapy, Chronic low back pain, Pain algometer, Visual sanalogue scale , Manual muscle Testing and Oswestry Disability Index.

1. Introduction

One of the most prevalent musculoskeletal conditions in the world, low back pain (LBP) is a major contributor to disability across all age groups [1]. Approximately 25% of people experiences chronic low back pain associated with sacroiliitis that lasts longer than three months, and the lifetime prevalence of LBP has been reported to be as high as 84% [2]. Healthcare expenses, lost productivity, and a lower quality of life are all greatly impacted by chronic LBP with sacroiliitis[3].

Nearly 90% of LBP presentations are classified as nonspecific, meaning that no clear pathological explanation can be found [4-6]. The sacroiliac joint (SIJ) is becoming more well acknowledged as a significant but frequently underdiagnosed source of pain among the many factors contributing to nonspecific LBP[7]. In some communities, the prevalence of SIJ dysfunction has been observed to reach 62%[8].

A non-invasive technique called extracorporeal shock wave therapy (ESWT) applies acoustic shock waves to specific tissues. Through mechanical and biochemical processes, ESWT has been demonstrated to lessen pain, encourage tissue repair, improve blood circulation, and stimulate nerve regeneration. It has shown successful in treating long- term musculoskeletal disorders. [9, 10].

Another cutting-edge physiotherapy technique is High Intensity Laser Therapy (HILT), which produces analgesic, anti-inflammatory, and bio stimulatory effects by delivering high-power laser radiation to deeper tissues [11]. A manual treatment method called Mulligan Mobilization with Movement (MWM) uses active movement and prolonged auxiliary joint glides to improve function and discomfort right away [12].

There is little data comparing ESWT and HILT when paired with Mulligan Mobilization in individuals with sacroiliitis-related persistent low back pain, despite prior research supporting the individual efficacy of ESWT, HILT,

and Mulligan Mobilization. Thus, the purpose of this study was to evaluate the efficacy of HILT with Mulligan Mobilization versus ESWT with Mulligan Mobilization in this cohort.

2. Materials and Methods

Study Design and Setting:
A comparative experimental investigation was carried out at Skanda Physiotherapy and Rehabilitation Centre,RR Nagar and Kempegowda Institute of Physiotherapy and KIMS Hospital in Bengaluru.

Participants:
A total of sixty individuals with sacroiliitis and chronic low back pain were enlisted and divided into two groups of thirty at random.

Inclusion Criteria:
- 41 to 59 years of age.
- Long-term low back pain with sacroiliitisthat lasts longer than three months.
- A score of at least five on the Visual Analog Scale.

Exclusion Criteria:
- Radiculopathy of the lumbar region.
- Surgical History of Lumbar Spine.
- Compression Fracture of Vertebra.
- Spinal Tumour or Infection.
- Inflammatory Rheumatic Disease.
- Pregnancy.
- Cardiovascular Disease.
- Structural abnormality of Lumbar Spine.

3. Intervention

Group A (ESWT + Mulligan Mobilization):
The Modus ESWT Touch Shock device, which has a 20-mm applicator, 2.8 bar pressure, 10 Hz frequency, and 2600 shocks each session, was used to administer extracorporeal shock wave therapy to the participants. The patient positioned in a Prone and explained treatment dosage was administered after applying gel on the patient treatment area concurrently with Mulligan Mobilization. Over the course of five weeks, three sessions were given.

Group B (HILT + Mulligan Mobilization):
In addition to Mulligan mobilization, participants received high intensity laser therapy utilizing the light care device (4 W power, 1.50 J/cm² intensity).The patient position in prone and laser probe administered in scanning mode across the L1–L5 and S1 regions for 15 minutes, producing a total energy of 2400 J each session.

Over the course of five weeks, three sessions were given.

Mulligan mobilization: SNAGS and MWM techniques are performed in the lumbar region in patients with prone position.

Outcome Measures:
1) Pressure Pain Threshold (Pain Algometer): Pain algometer usually used to assess pain pressure threshold in the lower back region during pre-operation, post-operation, and after treatment [13].
2) VAS Scale: Vas scale usually used to identify effect of treatment on chronic low back pain. A score less than 10 mm was consider as a no pain and a score greater than 100 mm was consider as a highest possible pain. This scale evaluates pain intensity before operation, after operation and after treatment[14].
3) MMT: Manual muscle testing usually used to evaluate strength of back extensor muscle before operation, after operation, and after treatment [15].
4) Oswestry Disability Index (ODI): It takes five minutes to complete and one minute to rate the self-administered ODI questionnaire. The degree of disability, which ranges minimum to bedbound, is correlated with scores [16].

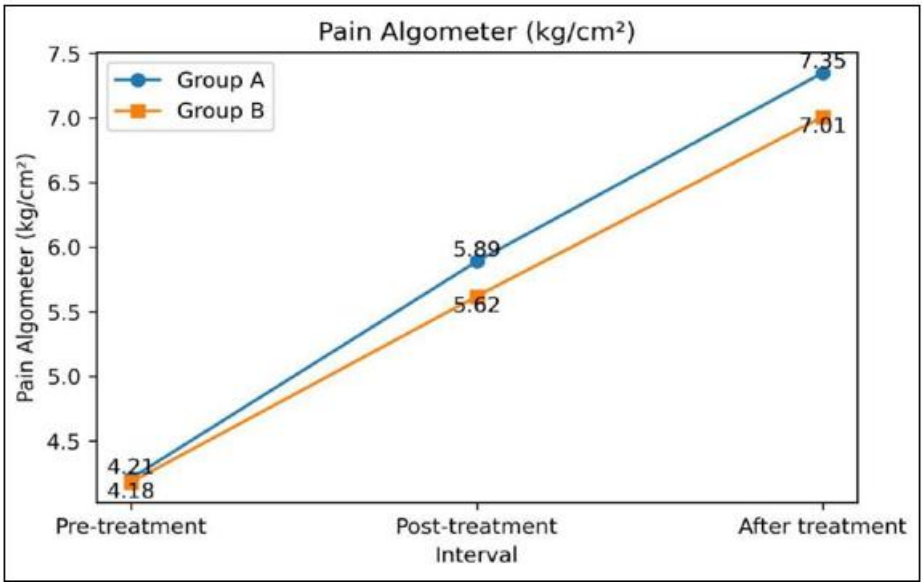
Statistical Analysis:
SPSS version 26.0 was used to analyze the data. The mean ± standard deviation was used to display descriptive statistics. The normalcy was evaluated using the Shapiro-Wilk test. For baseline comparisons, independent t-tests and chi-square tests were employed. Within-group changes were evaluated using Repeated Measures ANOVA with Bonferroni post-hoc analysis. For comparisons between groups, independent t-tests with Cohen's d were employed. Statistical significance was defined as a p-value of less than 0.05.

4. Results

Pain Algometer:
After-treatment interval, Group A showed a statistically significant improvement in pain threshold compared to Group B ($t = 2.21$, $p = 0.04$), accompanied by a large effect size (Cohen's $d = 0.77$), suggesting a clinically meaningful superiority of Group A over Group B.

Table 3: Between-group comparison of outcome variables at different intervals (with t value and effect size)- Pain Algometer (kg/cm²)

Interval	Group A (Mean ± SD)	Group B (Mean ± SD)	t value	p value	Cohen's d
Pre-treatment	4.21 ± 0.46	4.18 ± 0.51	0.21	0.84	0.06 (trivial)
Post-treatment	5.89 ± 0.42	5.62 ± 0.48	1.78	0.09	0.64 (moderate)
After treatment	7.35 ± 0.49	7.01 ± 0.44	2.21	0.04*	0.77 (large)

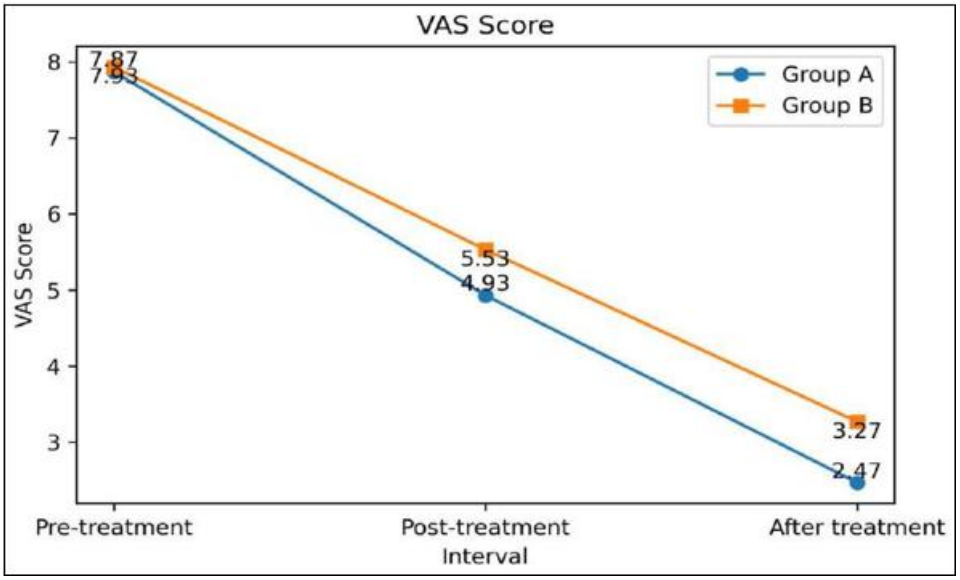


VAS:

At the after-treatment interval, Group A showed a statistically significant reduction in pain intensity compared to Group B ($t = -2.52$, $p = 0.02$), accompanied by a large effect size (Cohen's $d = 0.92$), indicating a clinically meaningful superiority of Group A in pain reduction.

Table 4: Between-group comparison of outcome variables at different intervals (with t value and effect size)- VAS

Interval	Group A (Mean ± SD)	Group B (Mean ± SD)	t value	p value	Cohen's d
Pre-treatment	7.87 ± 1.06	7.93 ± 1.10	−0.17	0.87	0.05 (trivial)
Post- treatment	4.93 ± 0.96	5.53 ± 1.06	−1.82	0.08	0.66 (moderate)
After treatment	2.47 ± 0.83	3.27 ± 0.96	−2.52	0.02*	0.92 (large)

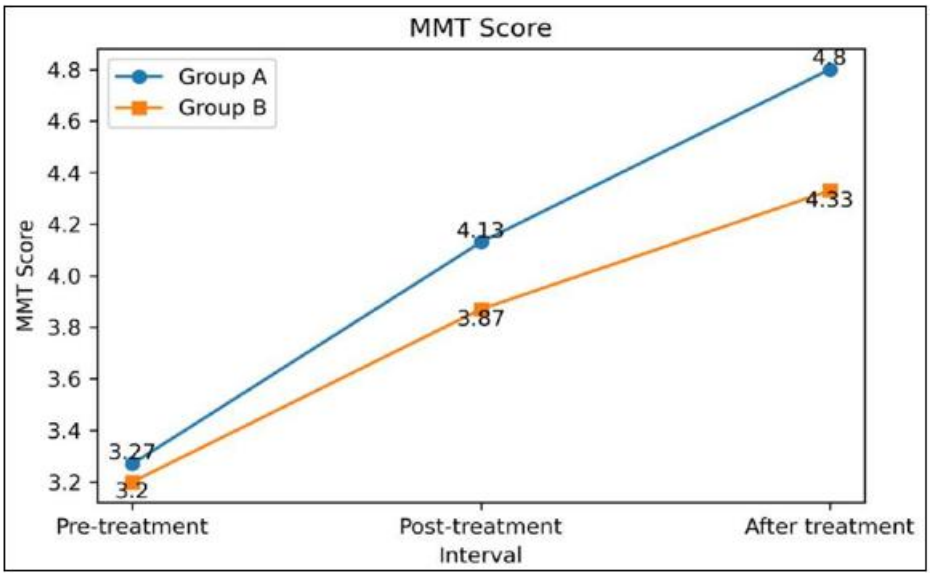


MMT:

At the after-treatment interval, Group A showed a statistically significant improvement in muscle strength compared to Group B ($t = 2.68$, $p = 0.01$), accompanied by a large effect size (Cohen's $d = 0.98$), indicating a clinically meaningful superiority of Group A over Group B.

Table 5: Between-group comparison of outcome variables at different intervals (with t value and effect size)- MMT score

Interval	Group A (Mean ± SD)	Group B (Mean ± SD)	t value	p value	Cohen's d
Pre-treatment	3.27 ± 0.46	3.20 ± 0.41	0.47	0.64	0.17 (small)
Post-treatment	4.13 ± 0.35	3.87 ± 0.35	1.94	0.06	0.71 (moderate)
After treatment	4.80 ± 0.41	4.33 ± 0.49	2.68	0.01*	0.98 (large)

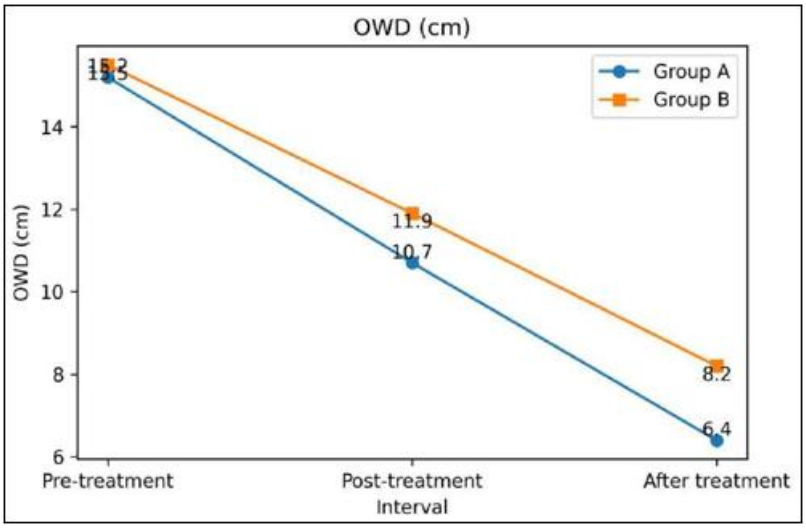


Oswestry Disability Index:

At the after-treatment interval, Group A showed a statistically significant improvement in functional outcome compared to Group B ($t = -2.74$, $p = 0.01$), accompanied by a large effect size (Cohen's $d = 1.00$), indicating a clinically meaningful superiority of Group A over Group B.

Table 6: Between-group comparison of outcome variables at different intervals (with t value and effect size)- OWD

Interval	Group A (Mean ± SD)	Group B (Mean ± SD)	t value	p value	Cohen's d
Pre-treatment	15.2 ± 2.1	15.5 ± 2.3	−0.38	0.71	0.14 (small)
Post-treatment	10.7 ± 1.9	11.9 ± 2.0	−1.80	0.08	0.66 (moderate)
After treatment	6.4 ± 1.8	8.2 ± 2.1	−2.74	0.01*	1.00 (large)



5. Discussion

The current study examined the effects of HILT with Mulligan Mobilization and ESWT with Mulligan Mobilization in individuals with sacroiliitis-related chronic low back pain. Pain was effectively reduced, muscle strength was increased, and functional capacity was improved by both therapies. On the other hand, ESWT and Mulligan Mobilization showed better long-term results. The biological and mechanical effects of shock waves, such as enhanced microcirculation, decreased inflammation, stimulation of tissue regeneration, and modification of nociceptive pathways, may be responsible for the improved results in Group A. These effects probably led to long-lasting gains in neuromuscular function and joint mechanics when paired with Mulligan mobilization. The results of this study support the use of Mulligan mobilization as a successful manual therapy method for SIJ dysfunction and are in line with earlier research demonstrating the efficacy of ESWT in chronic musculoskeletal pain problems.

6. Conclusion

For the treatment of sacroiliitis-related persistent low back pain, both ESWT and HILT in conjunction with Mulligan Mobilization work well. On the other hand, ESWT in conjunction with Mulligan Mobilization showed better results in terms of pain relief, increased muscle strength, and functional recovery. For chronic low back pain associated with the sacroiliac joint, this combination may be

a more successful therapy strategy.

7. Clinical Implications

- For the treatment of chronic low back pain associated with sacroiliitis, ESWT in conjunction with Mulligan mobilization may be the best option.
- Long-term pain reduction, increased muscle strength, and greater functional capacity are all benefits of the intervention.
- When treating persistent SIJ dysfunction, physiotherapists might use ESWT in addition to manual therapy.

8. Limitations & Future Recommendations

- Generalizability is constrained by the comparatively small sample size.
- There was no long-term monitoring done after the course of treatment.
- Larger sample numbers, longer follow-up times, and objective biomechanical or imaging evaluations should all be included in future research.

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