

Effectiveness of Piriformis Muscle Inhibition Technique on Piriformis Syndrome

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ABSTRACT

Background: Piriformis syndrome accounts for about 0.3-6% of low back pain cases, affecting mostly middle-aged adults. Symptoms worsen with prolonged sitting and physical activities, making timely intervention crucial for maintaining function and quality of life. Prior studies suggest that physiotherapy, especially manual mobilization of the piriformis muscle and adjacent neural structures, can significantly improve symptoms and functional outcomes. **Objective:** The objective was to evaluate the effectiveness of manual therapy in: 1) Reducing pain and neuropathic symptoms in piriformis syndrome. 2) Improving functional disability. **Methods:** A pre-post experimental design enrolled 30 participants (ages 20-60) with symptomatic piriformis syndrome. Piriformis inhibition technique and stretching was performed over two weeks, on alternate days. Outcomes were assessed quantitatively using Visual Analogue Scale (V.A.S) for pain, Douleur Neuropathique-4 (DN4) for neuropathic symptoms, Oswestry Disability Index (ODI) for disability. Statistical analysis included the Shapiro-Wilk test for normality and appropriate paired non-parametric or parametric tests for pre-post score comparisons ($p < 0.05$ considered significant) **Results:** Pain intensity decreased (VAS: $p = 0.001$), neuropathic symptoms reduced (DN4: $p = 0.001$), and functional disability improved (ODI: $p = 0.001$). Large effect sizes were noted in all domains. **Conclusion:** Manual therapy is a safe, effective, and non-invasive intervention for piriformis syndrome, significantly reducing pain and neuropathic features while improving functional ability, restoring mobility, prevent chronic disability, and enhance quality of life in affected individuals.

Keywords: Piriformis Syndrome, Muscle Inhibition Technique, Functional Disability, Sciatica

INTRODUCTION

The neuromuscular disorder known as Piriformis syndrome (PS) is typified by a combination of symptoms, including buttock and hip pain.⁽¹⁾ The back of the leg is frequently where the discomfort is transferred, and occasionally the medial foot is as well.⁽²⁾ This peripheral neuritis is thought to be caused by an aberrant piriformis muscle, compression, or irritation of the sciatic nerve as it passes beneath or through the muscle, even if it presents similarly to a real L5 or S1 radiculopathy.^(1,2) PS is frequently overlooked or challenging to diagnose because of its comparable appearance to lumbar disc herniation with radiculopathy, stenosis with radiculopathy, and neurogenic pain.⁽²⁾ One hundred and eighty three (6.25%) of 2,910 individuals with sciatica-related low back/buttock pain in a 2013 study had PS.⁽³⁾ Chronic somatic dysfunction, pathologic abnormalities of the sciatic nerve, and compensatory alterations that cause

pain, paresthesia, hyperesthesia, and muscular weakening might occur from a delay in identifying PS.⁽⁴⁾ The subjective and objective results of the evaluation are the main focus of PS treatment choices.⁽⁵⁾ Since an inflammatory reaction is typically suspected in the muscle or sciatic nerve, the first therapy objectives are to reduce inflammation, related pain, and spasm^(6,7). Pharmaceuticals, osteopathic manipulation, physical therapy, injectable therapy and surgical decompression are some possible treatment choices. Notably, there is no one therapy option that has been shown to be the most helpful in managing PS, and a prior systematic study found that there aren't many efficient nonoperative management strategies to assist improve this most frequently misdiagnosed illness⁽⁸⁾. Muscle inhibition technique in manual therapy involves the intentional decrease of excessive muscle activity to relieve pain, restore function, or enhance mobility^(9,10). Mechanisms of Action of Manual therapy, including muscle inhibition, initiates

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both local biomechanical and central neurophysiological responses—such as mechanoreceptor activation and pain modulation via the spinal cord and brain⁽¹⁰⁾. Ischemic compression and strain-counterstrain address trigger points by reducing localized muscle tone and nociceptive (pain) input⁽¹¹⁾. These approaches are believed to reduce pain, decrease muscle spasm, enhance range of motion, and improve nerve mobility by influencing peripheral and central nervous system pathways⁽¹⁰⁾. A clinical trial found that an integrated neuromuscular inhibition technique, which combines MET, ischemic compression, and strain-counter strain, is effective at deactivating upper trapezius trigger points and reducing pain and disability in patients with neck pain⁽¹¹⁾. Various studies indicate moderate support for manual inhibition techniques in treating musculoskeletal pain, though ideal protocols and long-term effects require further research^(10,11). Comprehensive reviews also highlight the multifactorial benefits of manual therapy, including muscle inhibition, for improving tissue extensibility and neurophysiological modulation of pain⁽¹⁰⁾.

MATERIALS AND METHODS

The study utilized a consent form, data collection form, pen, and laptop as materials. It was conducted in the Orthopaedic Musculoskeletal Department of Tertiary Hospital using a pre- and post-experimental design. The sample consisted of 30 participants, aged 20 to 60 years, of both genders, selected through simple random sampling. All participants experienced low back pain with radiating leg pain. The study duration was one year and six months. Outcome assessment involved three standardized tools: the Visual Analogue Scale (VAS) to measure pain intensity on a 0–100 mm scale, the Douleur Neuropathique en 4 Questions (DN4) to evaluate neuropathic pain, and the Oswestry Disability Index (ODI) to assess functional disability through 10 items covering daily activities. Each item was scored from 0 to 5, with a total score of 50 indicating severe disability. Participants aged 20–60 years, of both genders, showing symptoms of Piriformis Syndrome with positive Flexion-Adduction-Internal Rotation (FAIR) and Beatty's Tests were included. Exclusion criteria involved individuals outside the age range, those with other causes of hip or leg pain (e.g., lumbar

disc herniation, sciatic nerve injury, or sacroiliac and hip joint disorders), and patients with co-morbidities hindering treatment such as inflammatory diseases, malignancy, pregnancy, severe psychiatric disorders, diabetes, hypertension, or cardiovascular conditions. Subjects with a recent piriformis injury (less than one month) or recent surgery (within three months) were also excluded.

Piriformis Inhibition with Elbow

The subject was positioned in a prone lying posture, while the therapist stood at the side of the couch close to the affected side. The procedure began with the subject's knee flexed to 90 degrees and the hip moved into internal rotation. The therapist placed their thumb or elbow over the piriformis muscle, located at the intersection of a line joining the anterior superior iliac spine (ASIS) to the ischial tuberosity and another line joining the posterior superior iliac spine (PSIS) to the greater trochanter. The subject was instructed to externally rotate the hip while the therapist applied equal resistance against this movement at the medial aspect of the foot, using approximately one-third of the subject's muscular effort. The contraction was maintained for 6–10 seconds, after which the therapist moved the hip into further internal rotation until a new barrier was reached. This process was repeated 6–10 times. (8)

After the Procedure:

Stretching of the piriformis muscle was performed to promote muscle relaxation and improve flexibility.

RESULTS

Statistical rigor was ensured by first assessing data distribution using the Shapiro-Wilk test, which guided the choice of appropriate statistical tests: non-parametric Wilcoxon signed-rank test for VAS and DN4 (due to non-normal distribution), and parametric paired t-test for ODI (for normal data). A significance threshold of $p < 0.05$ (95% confidence interval) was adopted to establish meaningful differences in outcomes from pre- to post-treatment. This analytical framework allowed for robust, quantitative measurement of therapy effectiveness, providing reliable evidence for clinical decision-making in the management of Piriformis Syndrome.

Table No 1: Normality test using shapiro-wilk

Variable	Time Frame	z-value	p-value
VAS	Pre	0.858	0.001
	Post	0.807	0.001
DN4	Pre	0.637	0.001
	Post	0.612	0.001
ODI (%)	Pre	0.950	0.174
	Post	0.964	0.395

Statistical analysis were performed by using SPSS 23, and as the sample size is less than 2000 so Shapiro-Wilk test used to identify the normality and data follow normal distribution by ($P > 0.05$). Data set is not normally distributed for VAS and DN4 as the variables have not indicated p-value greater than 0.05

in the observation. Non-parametric Wilcoxon test is used. Data set is normally distributed for ODI (%) as the variable has indicated p-value greater than 0.05 in the observation. Parametric paired t test is used. $P < 0.05$ considered as statistically significant in the study (CI 95%)

Table No 2: The table shows the age distribution of 30 participants, ranging from 21 to 56 years. The highest proportion (13.3%) are aged 21, while most other ages have a lower and evenly distributed frequency.

Age	Frequency	Percent
21.00	4	13.3
22.00	2	6.7
23.00	2	6.7
24.00	2	6.7
25.00	2	6.7
26.00	1	3.3
28.00	2	6.7
29.00	1	3.3
30.00	3	10.0
31.00	1	3.3
32.00	1	3.3
34.00	1	3.3
35.00	1	3.3
42.00	1	3.3
43.00	1	3.3
45.00	1	3.3
46.00	1	3.3
50.00	1	3.3
53.00	1	3.3
56.00	1	3.3
Total	30	100.0

Table No:3 (Fair test table)

Fair Test	Frequency	Percent
Positive	30	100.0

Table No: 4 (Beatty Test Table)

Beatty Test	Frequency	Percent
Positive	30	100.0

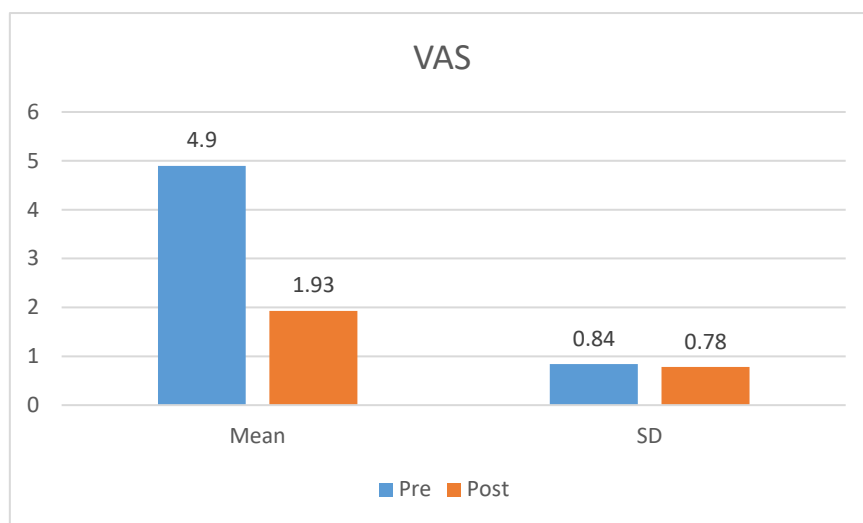
Pre and Post Test Analysis

Table No 5: Comparison of pre-test and post-test scores of VAS by paired Wilcoxon test

Time	Mean	SD	Mean Diff.	SD Diff.	Effect size	z-value	p-value
Pre	4.90	0.84	2.97	0.76	3.88	4.883	0.001
Post	1.93	0.78					

The mean value indicated changes post treatment and lower values are recorded for post treatment outcome and also the standard deviation shows the consistency with post treatment value which is less to pre value. The effect size or Cohen's D indicates 3.88 value which is assumed to be very high in effect size as per

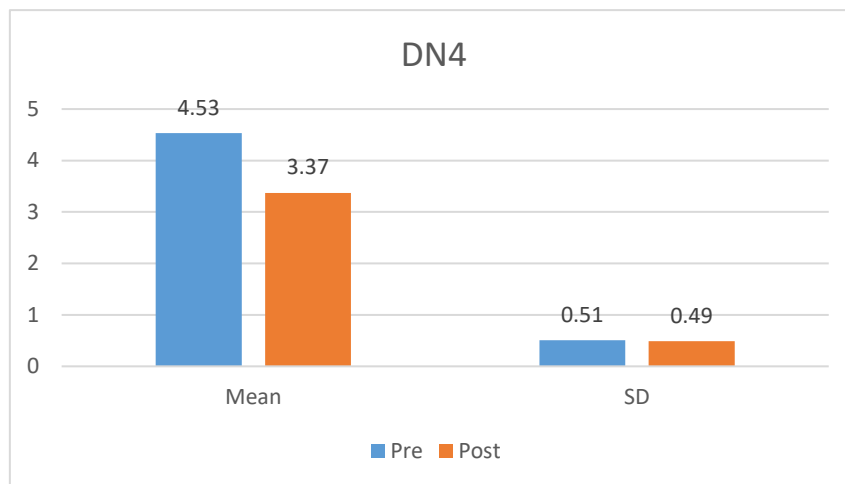
the standard parameters of reference. Based on the results of the test analysis at 5% significance level, there is a significant statistical reliable difference between the pre & post treatment values with p-value is less than the 5% significance level (i.e. $0.001 < 0.05$) in the study and therefore it justifies the improvements in health outcome post intervention.

**Graph No 1: Pre and post-test scores of VAS by paired Wilcoxon test****Table No 6: Comparison of pre-test and post-test scores of DN4 by paired Wilcoxon test**

Time	Mean	SD	Mean Diff.	SD Diff.	Effect size	z-value	p-value
Pre	4.53	0.51	1.17	0.38	3.08	5.152	0.001
Post	3.37	0.49					

The mean value indicated changes post treatment and lower values are recorded for post treatment outcome and also the standard deviation shows the consistency with post treatment value which is less to pre value. The effect size or Cohen's D indicates 3.08 value which is assumed to be very high in effect size as per

the standard parameters of reference. Based on the results of the test analysis at 5% significance level, there is a significant statistical reliable difference between the pre & post treatment values with p-value is less than the 5% significance level (i.e. $0.001 < 0.05$) in the study and therefore it justifies the improvements in health outcome post intervention.



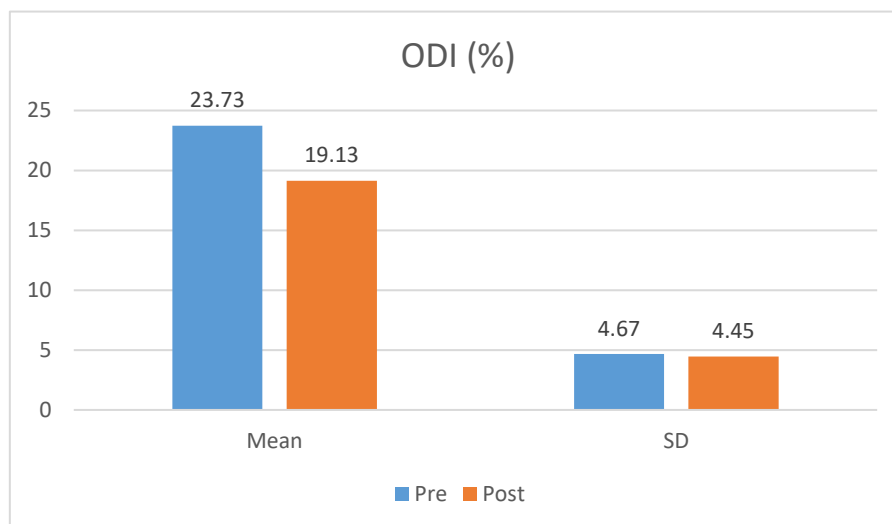
Graph No 2: Comparison of pre-test and post-test scores of DN4 by paired Wilcoxon test

Table No 7: Comparison of pre-test and post-test scores of ODI (%) by paired Wilcoxon test

Time	Mean	SD	Mean Diff.	SD Diff.	Effect size	t-value	p-value
Pre	23.73	4.67	4.60	0.86	5.38	29.468	0.001
Post	19.13	4.45					

The mean value indicated changes post treatment and lower values are recorded for post treatment outcome and also the standard deviation shows the consistency with post treatment value which is less to pre value. The effect size or Cohen's D indicates 5.38 value which is assumed to be very high in effect size as per

the standard parameters of reference. Based on the results of the test analysis at 5% significance level, there is a significant statistical reliable difference between the pre & post treatment values with p-value is less than the 5% significance level (i.e. $0.001 < 0.05$) in the study and therefore it justifies the improvements in health outcome post intervention.



Graph No 3: Comparison of pre-test and post-test scores of ODI (%) by paired Wilcoxon test

DISCUSSION

The present study evaluated the effect of Piriformis Inhibition on pain, neuropathic symptoms, and functional disability in individuals presenting with piriformis-related low back pain and sciatica. The

statistical findings of the study demonstrated significant improvements across all three outcome measures –Visual Analogue Scale (VAS), Douleur Neuropathique en-4 (DN4) questionnaire, and Oswestry Disability Index (ODI). These results highlight the clinical utility of ICM as an effective

physiotherapeutic technique for managing piriformis syndrome and associated neuropathic symptoms. The analysis of VAS scores revealed a substantial decrease in pain intensity, with mean scores reducing from ± 0.84 to 1.93 ± 0.78 following intervention (Table no.5) (Graph no. 1). The mechanism underlying this improvement can be attributed to the neurological reflex inhibition which reduces muscle spasm resulting in reduced pain. The DN4 scores showed a significant improvement, with mean values decreasing from 4.53 ± 0.51 to 3.37 ± 0.49 and an effect size of 3.08 (Table no.6) (Graph no.2). The piriformis muscle, when hypertonic, can compress or irritate the sciatic nerve, producing neuropathic features. By applying piriformis inhibition technique, the muscle hypertonicity is reduced, further mechanical load on the nerve is reduced, leading to a decline in peripheral sensitization and improved neural mobility. This could explain the marked reduction in neuropathic symptoms observed post-treatment. The ODI scores reduced significantly from 23.73 ± 4.67 to 19.13 ± 4.45 (Table no.7) (Graph no.3). The improvement in ODI indicates that participants experienced less disability in performing daily activities such as sitting, walking, bending, and lifting. Functionally, this suggests that by reducing pain and improving muscle compliance, piriformis mobilization enabled participants to regain functional independence. Improved sciatic nerve mobility facilitated smoother movement patterns and enhanced participation in daily tasks. From a clinical perspective, these results support the use of piriformis mobilization as part of a physiotherapy treatment plan for patients presenting with piriformis syndrome or sciatica-like symptoms. The improvements in pain, neuropathic features, and disability highlight its role not only in symptom management but also in functional restoration. Given that the majority of participants were young to middle-aged adults, the intervention may have considerable value in preventing chronic disability and promoting return to work and normal activity.

CONCLUSION

The findings of this study demonstrate that piriformis mobilization significantly reduces pain intensity, alleviates neuropathic pain symptoms, and improves functional ability. The large effect sizes observed in all outcome measures reinforce the clinical

importance of this technique. As a safe, non-invasive, and effective physiotherapeutic approach, piriformis mobilization can be recommended as a primary intervention for patients with piriformis-related pain and sciatic nerve irritation. Early implementation in rehabilitation may prevent chronicity, reduce dependence on pharmacological management and enhance quality of life.

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