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To Contrast The Efficacy Of Muscle Energy Technique With Stretching Versus Myofascial Release With Strengthening Along With Transcutaneous Electrical Nerve Stimulation In Subjects With Piriformis Syndrome

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ABSTRACT

***Background*:** Piriformis Syndrome is an uncommon neuromuscular condition mimicking the sciatica like symptoms. This could lead to lower back pain which is common musculoskeletal problem and major reason for decrease activity. This study is helpful for the diagnosis of PS and to relieve pain using TENS, increase muscle strength, increase range of motion using MET with stretching and MFR with strengthening and to improve Quality of life.

Methods: This comparison study was done in Physiotherapy department of SMI Hospital by pre-post intervention type. Total 30 subjects were selected and divided into two groups 15 each. One group was given MET along with stretching and other group was given MFR along with strengthening. Along with these, both groups received TENS. Visual Analog Scale, Lower extremity functional scale, WHOQOL-Beef was used as outcome measures.

Conclusion: The Study indicated that muscle energy technique with stretching may be superior for reducing pain, whereas myofascial release with strengthening exercises may be more effective for enhancing range of motion, muscle strength and functional performance.

Keywords: Piriformis Syndrome, VAS, Lower extremity functional scale, Muscle energy technique, myofascial release technique, stretching, strengthening, WHO QOL Bref.

INTRODUCTION:

Piriformis syndrome is a medical condition where the sciatic nerve becomes trapped or compressed at the point where it passes near the ischial tuberosity, a bony prominence in the pelvis. **[Brandon L. Hicks 2023]**

The sciatic nerve is susceptible to entrapment at two possible sites near the ischial tuberosity: in front of the piriformis muscle or behind the gemelli-obturator internus complex. **[Hicks, 2024]** Piriformis syndrome, also known as pseudo

sciatica or pseudo disc, is a condition where the branches of the sciatic nerve become inflamed due to pressure from a damaged or irritated piriformis muscle. **[Nithya Narayanan Kutty 2020]** The term was originally introduced by Robinson in 1947. Although piriformis syndrome has various potential causes, its clinical symptoms are relatively uniform, typically involving pain in the gluteal/buttock area that may radiate down the leg, accompanied by numbness and tingling sensations in the sciatic nerve distribution. **[Vani Vijay 2019, Hicks BL 2024]**

The piriformis muscle, which rotates the hip outward, lies close to the sciatic nerve. When the piriformis muscle becomes irritated or inflamed, it can compress the adjacent sciatic nerve, leading to pain similar to sciatica. Diagnosing piriformis syndrome can be challenging, as it relies on medical history and physical examination. Furthermore, other conditions like lumbar canal stenosis, disc inflammation, or pelvic issues can exhibit similar symptoms, making accurate diagnosis even more difficult. **[Siddiq MAB 2018, Chang A, Ly N 2023]**

Piriformis syndrome typically presents unilaterally, with the sacrum rotating anteriorly on the opposite side of the affected piriformis muscle, causing compensatory rotation of the lower lumbar vertebrae in the opposite direction. The contracted piriformis muscle can also lead to external rotation of the hip on the same side. A key diagnostic sign, known as the positive Piriformis sign, is observed when the patient lies supine and the affected foot is externally rotated. Furthermore, attempting to move the foot towards the midline through active range of motion exacerbates the pain. **[Elbkheet 2016]**

Piriformis syndrome can be classified into two types: primary and secondary. Primary piriformis syndrome is caused by anatomical abnormalities, such as a split piriformis muscle or an unusual sciatic nerve path, accounting for less than 15% of cases. Secondary piriformis syndrome, on the other hand, is triggered by external factors, including severe injury (macrotrauma), repetitive strain (microtrauma), reduced blood flow (ischemic mass effect), or localized tissue damage (local ischemia). The most common cause of piriformis syndrome is a severe blow to the buttocks, leading to inflammation, muscle spasms, and scarring that compresses the sciatic nerve. Repetitive strain from activities like long-distance walking or running can also cause microtrauma, leading to piriformis syndrome. The piriformis muscle is susceptible to strain and hypertrophy due to its constant use during walking, and gait abnormalities, such as those caused by leg length discrepancies, can exacerbate this condition. **[Usham Shyamkesho Singh, 2013]**

Dr. Fred Mitchell Sr. developed the muscleenergy technique. It is a non-invasive treatment thatcan be used to extend or stretch stiff muscles andfascia. MET primarily targets soft tissues, but it alsosigniÞcantly contributes to joint mobilisation, whichenhances extensibility of muscle and increasesrange of motion of joints through a mechanismknown as “enhanced tolerance to stretch.” **(Niraj Kumar, Navneet Badoni Vet al. (2023)**

AIM OF THE STUDY:

Aim of the study is to determine the “Efficacy of Muscle Energy Technique with Stretching versus Myofascial Release Technique with Strengthening along with Transcutaneous Electrical Nerve Stimulation in subjects with Piriformis Syndrome.”

Objectives of the study:

- To evaluate and determine the effectiveness of Muscle Energy Technique with stretching versus Myofascial Release combined with strengthening techniques in subjects with Piriformis Syndrome.
- To assess the Quality of life of the subjects.

Need of the study:

Although various studies have been using Muscle Energy technique, Stretching, Myofascial release and Strengthening techniques for treatment of piriformis syndrome but none of the study has done this study by combining two treatment protocols. Thus it was needed to see the effect of of Muscle Energy Technique with Stretching versus Myofascial Release Technique with Strengthening along with Transcutaneous Electrical Nerve Stimulation in subjects with Piriformis Syndrome to find out which one is the better option for the Rehabilitation protocol.

MATERIALS AND METHODS

In this study a random sampling technique was used and 30 subjects were divided into two groups. 15 subjects were selected randomly and was included in group A and 15 patients in Group B. These subjects were solicited from Shri Mahant Indresh Hospital, Department of Physiotherapy, Patel Nagar, Dehradun (Uttrakhand0) and selected according to inclusion and exclusion criteria.

Inclusion Criteria: Age 20-50 years, Both gender (male and female),Patients diagnosed with Piriformis Syndrome, Pain persists for at least 1 month, Inability to perform activity of daily life, Patients will minimum 10% limitation of ROM, Piriformis Test (Positive).

Exclusion Criteria: Patients with neurological disorders, Pain due to specific cause (example: fracture. Lumbar stenosis, disc herniation), Other systemic diseases causing pain in back and buttocks, History of any congenital anomalies, Pregnant woman.

Outcome Measures: Lower Extremity Functional Scale (LEFS), Visual Analogue scale (VAS), Range Of Motion (ROM), WHO Quality of Life Beef Scale.

Procedure:

The Piriformis syndrome participants were selected by the proper screening and fulfilling the inclusive and exclusive criteria and were divided into two groups Group A and Group B.Instructions will be given to the subjects about techniques performed.

Pre-Testing – Check for the intensity pain using Visual Analogue Scale (VAS) for each subjects and measure the range of motion of each subjects using a Goniometry followed by performing:

Piriformis Test:

Subject's Position: Side lying with the test leg uppermost.

Therapist's Position: standing by the side of the subject.

Procedure: the patient flexes the hip to 60 degrees with the knee flexed. The therapist stabilizes the hip with one hand and applies a downward pressure to the knee.

Positive test: Pain is elicited in the muscle. If the muscle is pinching the Sciatic nerve, pain results in the buttock and sciatica may be experienced by the patient. **[David J Magee 4th edition]**

After obtaining the informed consent the subjects will be divided into two group's random sampling.

Group A: Muscle Energy Technique with stretching

Total 15 subjects were assigned in this group and each individual received Muscle Energy Technique with stretching and active range of motion exercises along with Transcutaneous Electrical Nerve Stimulation (TENS).

Procedure for Muscle Energy Technique:

Subject's Position: Prone lying, but with the unaffected leg straight and the affected leg in knee flexion.

Therapists Position: Standing by the side of treatment table.

Procedure: The therapist makes sure that the pelvis/sacrum was stabilized with their right hand, while controlling the subject's affected leg with their left hand. The subject's affected leg was passively taken into internal rotation until the point of bind is felt, and the subject was asked to contract the Piriformis by pulling their leg against resistance applied by the therapist's left hand. This will induce an external rotation of the hip joint.

After a 10-second contraction of the Piriformis, and during the relaxation phase, the therapist takes the subject's affected hip into further internal rotation. to lengthen the Piriformis. Subjects performed 10 repetitions. **(John Gibbons)**

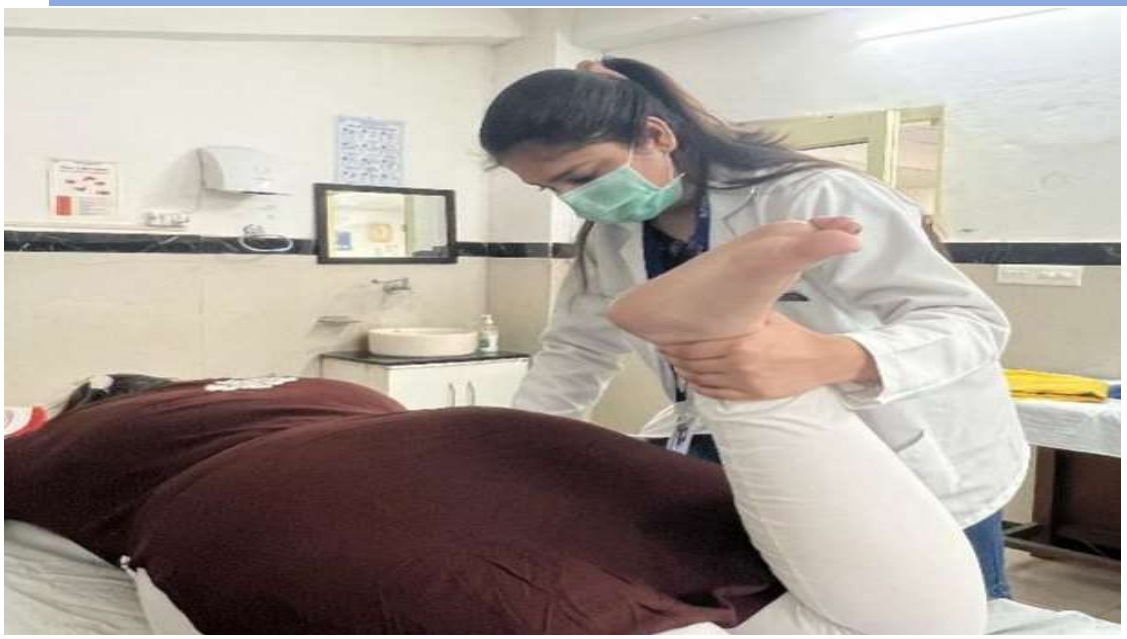


Fig.4.12.1 Showing Procedure for Muscle Energy Technique.

Procedure for Stretching Technique:

The therapist instructs the subject to lay in a supine lying position, then stands at the affected side of the patient and guides them to perform prolonged stretching of Piriformis muscle. This starts with flexion, adduction and internal rotation of ipsilateral hip with patient in supine lying position. The foot should rest on the lateral side of her opposite knee. Continue stretching by gently increasing adduction, internal rotation and hip flexion by leading his knee toward opposite shoulder. Piriformis stretch will be given for 20 – 30 seconds and repeated five times. **(Sarmitha, R., & Subramaniam, S. S.,2020)**

Fig.1: Showing procedure for Stretching Technique

Group B: Myofascial Technique with Strengthening

Total 15 subjects were assigned in this group and everyone received Myofascial release Technique with strengthening Exercises and active range of motion exercises with Transcutaneous Electrical Nerve Stimulation (TENS).

Procedure for Myofascial Release:

The therapist instructs the subject to be in a prone lying position. The therapist stands at the affected side of the pain. Adjust the height of the bed according to the preference of the therapist. Perform Myofascial release, using the therapist's palm directly on the Piriformis muscle, press on the trigger point directly and hold for a while (10 to 100 seconds). Apply small kneading strokes back and forth following the direction of the muscle fibres. Stroke parallel to the fibres to elongate them, because that might be more effective. Perform this for five minutes at least and continue for 3 sets of five minutes each. **(Sarmitha, R., & Subramaniam, S. S.,2020)**

Fig.2: Showing procedure for Myofascial Release

[A] Strengthening Exercises of Lower limb:

Strengthening exercises that target the Piriformis and larger buttock muscles are crucial for building muscle strength and developing flexibility in the lower back, pelvis, and hip.

1. Bridge:

To perform gluteal bridges, start by lying on the back with both legs straightened out and flat on the ground.

- ✧ Slowly bend both knees while keeping feet flat on the ground and toes pointed straight forward.
- ✧ Lay the arms flat on the side of the body with palms facing down.
- ✧ Slowly raise the hips while engaging the abdominal and buttock muscles.
- ✧ Lift the hips as high as possible, without pain, to make a straight line from the shoulder to the knee.
- ✧ Hold this position for 5 seconds.
- ✧ Gently lower the hips back to the ground.

Begin holding the bridge position for 5 seconds initially and slowly work up to 30 seconds. Aim to complete a set of three stretches daily.

Fig.3: Showing procedure for gluteal bridges

2. Straight Leg Raises

To perform the straight leg raise exercise, start by lying on the back with legs straightened out and flat on the ground.

- ✧ Bend one leg and place the foot flat on the floor
- ✧ Raise the opposite leg making an angle of approximately 45˚ with the floor.
- ✧ Hold the raised leg for 5 seconds and return to the starting position.

Hold the stretch for 5 seconds initially and slowly work up to 30 seconds. Repeat the exercise with the opposite leg. Aim to complete one set of three stretches on each side.

Fig.4: Showing procedure for straight leg raise exercises

3. Side Leg Raises

To perform the side leg raise exercise, start by lying on the right side and placing a towel under the head to support the head and neck.

- ✧ Place the right hand on the hip or in front of the waist to stabilize the upper body.

- ✧ Extend the body to form a straight line with legs stacked on top of each other.
- ✧ Engage the core and slowly begin to raise the right leg 10-15 inches away from the ground.

Perform 10-15 leg raises and repeat with the opposite leg. Aim to complete 3 sets of repetitions daily.

Fig.5: Showing procedure for side leg raise exercise

4. Bird Dog

To perform the bird-dog exercise, start by getting on all fours with arms and legs shoulder-width apart in the quadruped position.

- ✧ Extend the right leg outward with a straight back and toes pointing away from the body.
- ✧ Simultaneously, extend the left arm out in front of the body.

Hold the stretch for 5 seconds initially and slowly work up to 30 seconds. Repeat with the opposite arm and leg. Aim to complete one set of three stretches on each side. **(Natalie Ullrich 2023)**

Fig.6: Showing procedure for bird-dog exercise,

Transcutaneous Electrical Nerve Stimulation: Subjects from both the groups were positioned in prone lying. Electrodes will be placed in buttock region to calf region in radiating pattern through the course of sciatic nerve.

Parameters: frequency (2- 250 Hz) and wider pulse of (200-250micro sec) with intensity (0-80 mill amperes) will be used for about 15-20 minutes. **(Ahmad Siraj S ,2022)**

RESULT:

The study utilized a hybrid approach to statistical analysis, combining manual calculations with software-based tools, specifically SPSS version 21, to examine participant scores. . Evaluation was done at first day (week 0), week 3 and week 6. Evaluation included Lower extremity functional scale for functional ability, Visual analogue scale for pain measurement, Range of motion using Goniometer for measuring mobility and WHO-Quality of Life BREF questionnaire for assessing quality of life of the subjects.

At first comparison was done within the groups by non-parametric test i.e., Kruskal Wallis Test to check the effectiveness of the treatment at 3 point of overall time duration (Week 0, Week 3 and Week 6). Than to rule out overall effectiveness of the treatment protocol Between both group (Group A and Group B) the non-Parametric test i.e., Mann-Whitney Test was applied.

The result was analyzed by non-parametric test for within the group in WEEK0, WEEK 3, WEEK 6.

GROUP A- ANALYSYIS

Stastical Software SPSS 21 version was used for analysis of the data. To analyze the difference within Group A Lower Extremity Functional Scale, Visual Analogue Scale, Range of motion, and WHO-QOL BREF score in WEEK 0, WEEK 3, WEEK 6 using non parametric test (Kruskal Wallis Test).

Table 6.1 LOWER EXTREMITY FUNCTIONAL SCALE SCORES (GROUPA)

Duration	Mean±SD	p value	Result
Week 0	28.5 ± 4.2 (20-37	-	-
Week 3	35.5 ± 4.8 (28-43)	0.041	significant

Week 6	43.2 ± 5.3 (36-51	0.013	Significant

Table.1: Comparsion within Group A showing Mean±SD of LOWER EXTREMITY FUNCTIONAL SCALE. Scale at Week 0, Week 3, Week 6.

To analyze the difference in the Lower Extremity Functional Scale within Group using non parametric test. The difference in Lower Extremity Functional Scale score measurements from Week 0, week 3 and week 6 were as WEEK 0 Mean±SD 28.5 ± 4.2, WEEK 3 Mean±SD 35.5 ± 4.8 and at WEEK 6 Mean±SD 43.2 ± 5.3.

It was found that the p value was 0.05 shows significant stastical improvement in subjects within weeks. Thus it shows that there is stastsical significant difference in LOWER EXTREMITY FUNCTIONAL SCALE of Group A from WEEK 0 to Week 6 i.e, accepting the alterative hypothesis (H_1) and rejecting null hypothesis (H_0)

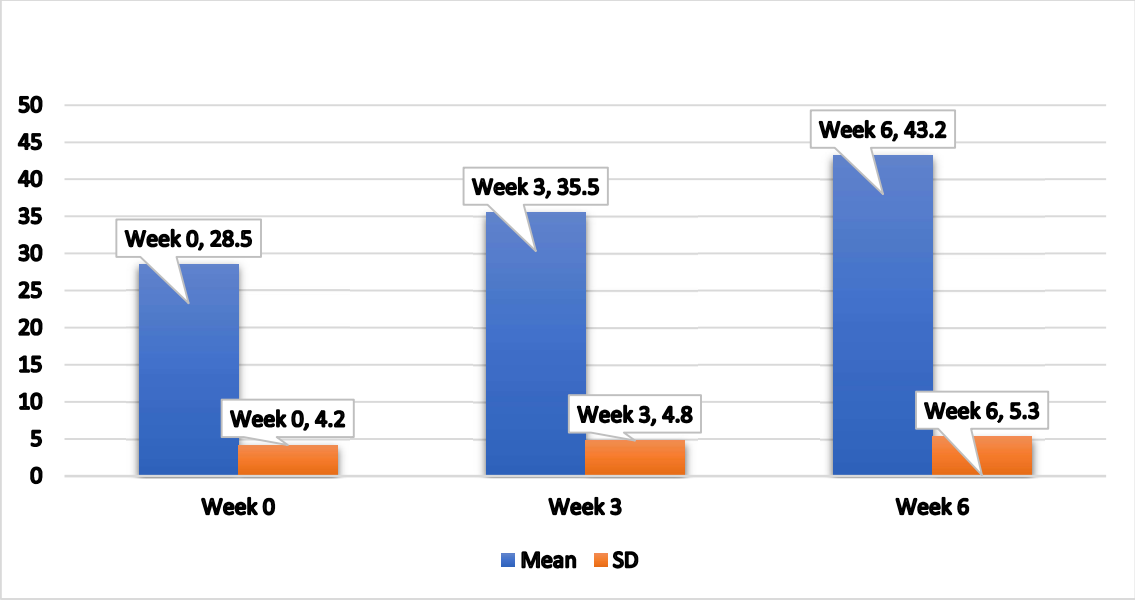


*Fig.1 Comparison within Group A showing Mean±SD of LOWER EXTREMITY FUNCTIONAL SCALE.

Table 6.2 VISUAL ANALOUGE SCALE (GROUP A)

Duration	Mean±SD	p value	Result
Week 0	7.5 ± 1.8	-	-
Week 3	5.5 ± 1.4	0.023	significant
Week 6	3.2 ± 1.1	0.005	Highly Significant

Table 2. Comparison within Group A showing Mean±SD of VISUAL ANALOUGE SCALE

Scale at Week 0, Week 3, Week 6.

To analyze the difference in the VISUAL ANALOUGE SCALE within Group using non parametric test. The difference in VISUAL ANALOUGE SCALE score measurements from Week 0, week 3 and week 6 were as WEEK 0 Mean±SD 7.5 ± 1.8 , WEEK 3 Mean±SD 5.5 ± 1.4 , and at WEEK 6 Mean±SD 3.2 ± 1.1

It was found that the p value was 0.05 shows significant stastical improvement in subjects within weeks. Thus it shows

that there is stastsical significant difference in VISUAL ANALOUGE SCALE of Group A from WEEK 0 to Week 6 i.e, accepting the alterative hypothesis (H_1) and rejecting null hypothesis (H_0)

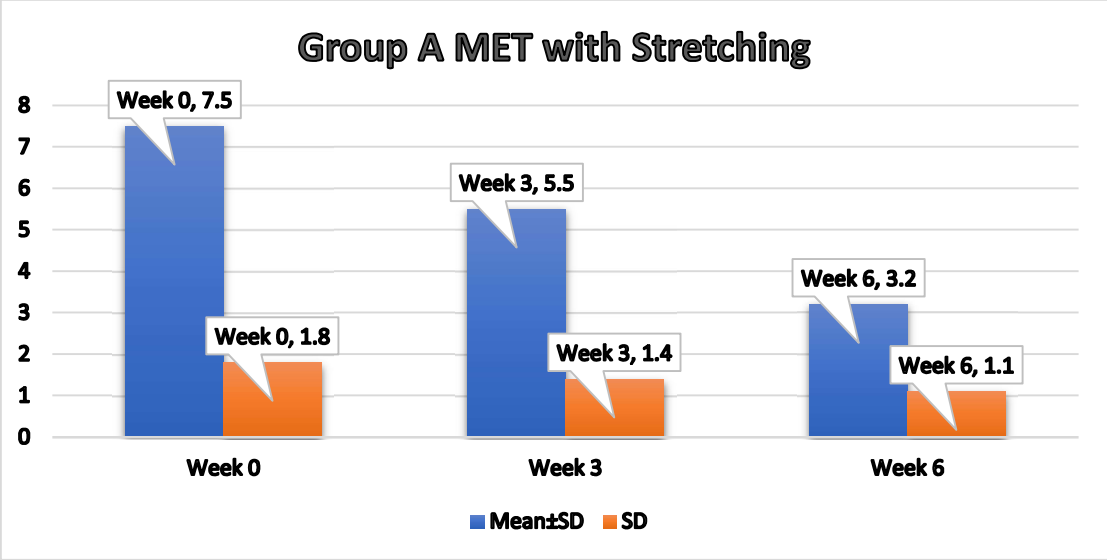


*Fig. 2: Comparison within Group A showing Mean±SD of VISUAL ANALOUGE SCALE

Table 6.3 RANGE OF MOTION (GROUP A)

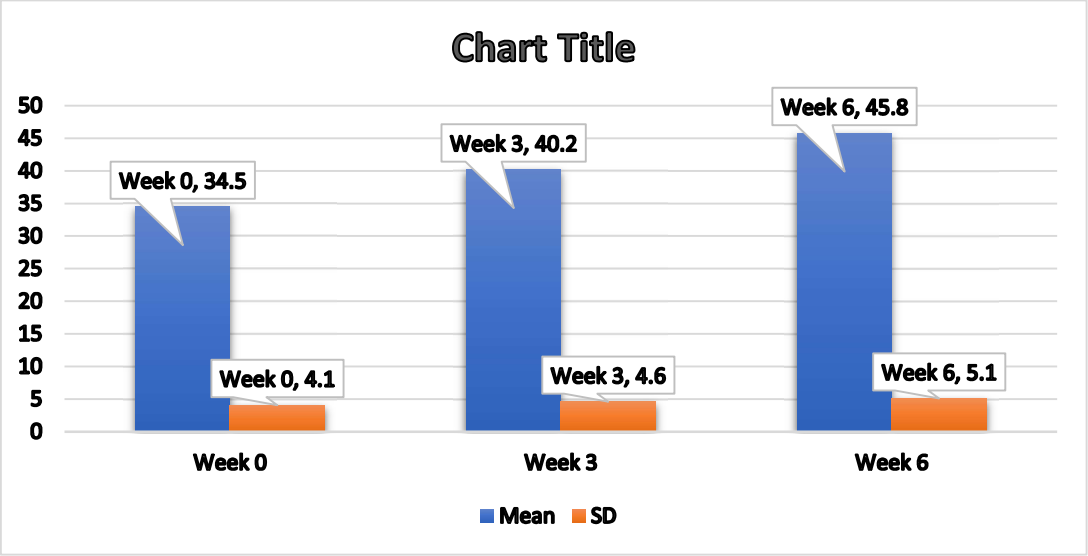
Duration	Mean±SD	p value	Result
Week 0	34.5 ± 4.1	-	-
Week 3	40.2 ± 4.6	0.049	significant
Week 6	45.8 ± 5.1	0.015	Significant

Table 3. Comparison within Group A showing Mean±SD of RANGE OF MOTION

Scale at Week 0, Week 3, Week 6.

To analyze the difference in the RANGE OF MOTION within Group using non parametric test. The difference in RANGE OF MOTION score measurements from Week 0, week 3 and week 6 were as WEEK 0 Mean±SD 34.5 ± 4.1 , WEEK 3 Mean±SD 40.2 ± 4.6 , and at WEEK 6 Mean±SD 45.8 ± 5.1.

It was found that the p value was 0.05 shows significant Stastical improvement in subjects within weeks. Thus it shows that there is Stastical significant difference in RANGE OF MOTION of Group A from WEEK 0 to Week 6 i.e, accepting the alterative hypothesis (H_1) and rejecting null hypothesis (H_0)



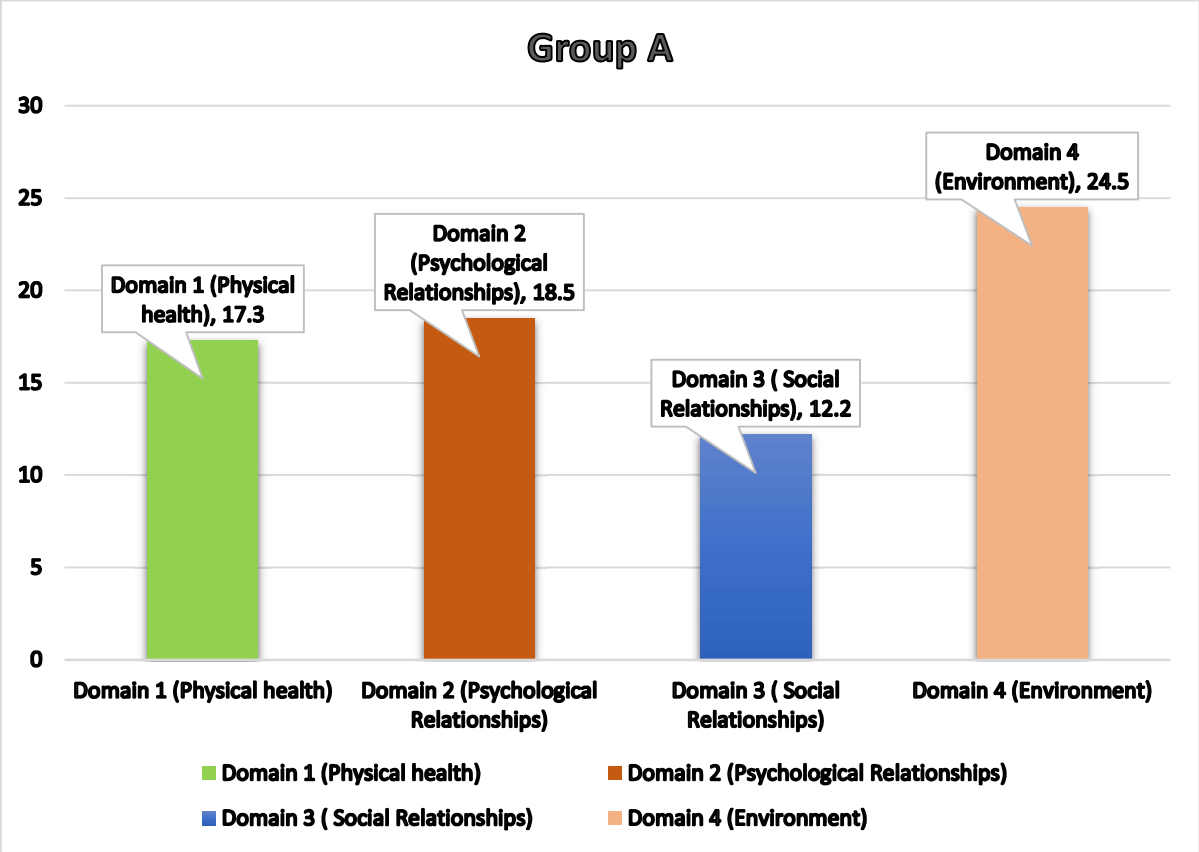
* Fig. 3: Comparison within Group A showing Mean±SD of RANGE OF MOTION

WHO QUALITY OF LIFE BREF QUESTIONNARIE (GROUP A WEEK 0)

Domain	mean	SD	P value	Result
Domain 1 (Physical health)	17.3	3.5	0.028	significant
Domain 2 (Psychological Relationships)	18.5	4.2	0.041	Significant
Domain 3 (Social Relationships)	12.2	3.1	0.923	Not significant
Domain 4 (Environment)	24.5	4.8	0.053	Not significant

Table 4. Comparison within Group A showing Mean±SD of WHO QUALITY OF LIFE BREF QUESTIONNARIE Scale at Week 0

To analyze the difference in the WHO QUALITY OF LIFE BREF QUESTIONNARIE within Group using non parametric test. The difference in WHO QUALITY OF LIFE BREF QUESTIONNARIE score measurements between domains from Week 0, Domain 1 Mean±SD 17.3± 3.5, Domain 2 Mean±SD 18.5± 4.2 , Domain 3 Mean±SD 12.2± 3.1, Domain 4 Mean±SD 24.5± 4.8

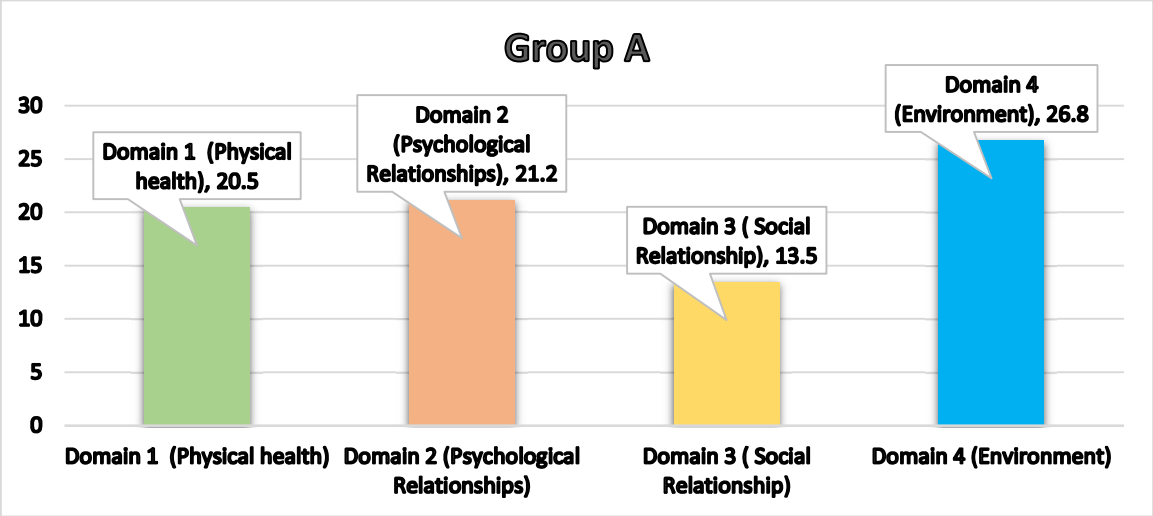


* Fig. 4: Comparison within Group A showing Mean±SD of WHO QUALITY OF LIFE BREF QUESTIONNARIE WHO QUALITY OF LIFE BREF QUESTIONNARIE (GROUP A WEEK 3)

Domain	mean	SD	P value	Result
Domain 1 (Physical health)	20.5	3.8	0.018	Significant
Domain 2 (Psychological Relationships)	21.2	4.5	0.031	Significant
Domain 3 (Social Relationship)	13.5	3.4	0.156	Not significant
Domain 4 (Environment)	26.8	5.1	0.065	Not significant

Table 5: Comparison within Group A showing Mean±SD of WHO QUALITY OF LIFE BREF QUESTIONNARIE Scale at Week 3

To analyze the difference in the WHO QUALITY OF LIFE BREF QUESTIONNARIE within Group using non parametric test. The difference in WHO QUALITY OF LIFE BREF QUESTIONNARIE score measurements between domains from Week 3, Domain 1 Mean±SD 20.5± 3.8, Domain 2 Mean±SD 21.2± 4.5 , Domain 3 Mean±SD 13.5± 3.4, Domain 4 Mean±SD 26.8± 5.1.

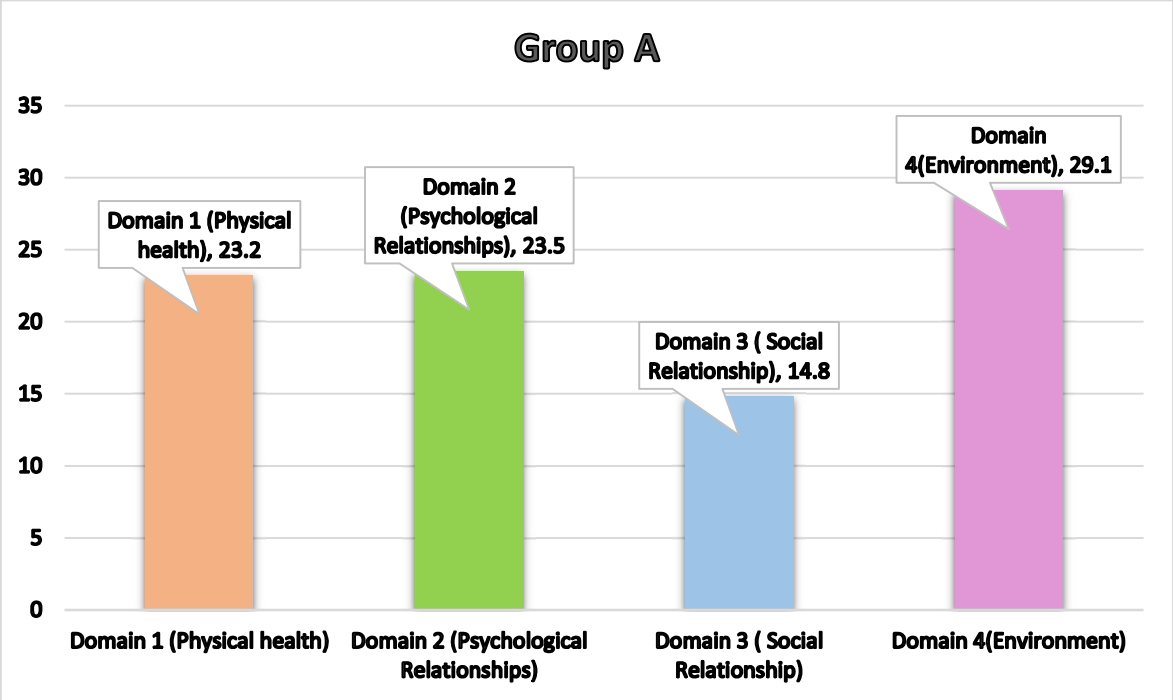


* Fig. 5: Comparison within Group A showing Mean±SD of WHO QUALITY OF LIFE BREF QUESTIONNARIE WHO QUALITY OF LIFE BREF QUESTIONNARIE (GROUP A WEEK 6)

Domain	mean	SD	P value	Result
Domain 1 (Physical health)	23.2	4.2	0.012	Significant
Domain 2 (Psychological Relationships)	23.5	4.8	0.023	Significant
Domain 3 (Social Relationship)	14.8	3.7	0.219	Not significant
Domain 4(Environment)	29.1	5.4	0.082	Not significant

Table 6. Comparison within Group A showing Mean±SD of WHO QUALITY OF LIFE BREF QUESTIONNARIE Scale at Week 6

To analyze the difference in the WHO QUALITY OF LIFE BREF QUESTIONNARIE within Group using non parametric test. The difference in WHO QUALITY OF LIFE BREF QUESTIONNARIE score measurements between domains from Week 6, Domain 1 Mean±SD 23.2± 4.2, Domain 2 Mean±SD 23.5± 4.8 , Domain 3 Mean±SD 14.8± 3.7, Domain 4 Mean±SD 29.1± 5.4.



* Fig. 6: Comparison within Group A showing Mean±SD of WHO QUALITY OF LIFE BREF QUESTIONNARIE

GROUP B ANALYSIS

Stastical Software SPSS 21 version was used for analysis of the data. To analyse the difference within Group A Lower Extermity Fucntional Scale, Visual Analouge Scale, Range of motion, and WHO-QOL BREF score in WEEK 0, WEEK 3, WEEK 6 using non parametric test (Kruskal Wallis Test).

LOWER EXTREMITY FUNCTIONAL SCALE SCORES (GROUP B)

Duration	Mean±SD	p value	Result
Week 0	31.2 ± 4.5	-	-
Week 3	38.5 ± 5.1	0.041	significant
Week 6	45.1 ± 5.6	0.013	Significant

Table 7: Comparsion within Group B showing Mean±SD of LOWER EXTREMITY FUNCTIONAL SCALE.

Scale at Week 0, Week 3, Week 6.

To analyze the difference in the Lower Extremity Functional Scale within Group using non parametric test. The difference in Lower Extremity Functional Scale score measurements from Week 0, week 3 and week 6 were as WEEK 0 Mean±SD 31.2 ± 4.5, WEEK 3 Mean±SD 38.5 ± 5.1 and at WEEK 6 Mean±SD 45.1 ± 5.6.

It was found that the p value was 0.05 shows significant stastical improvement in subjects within weeks. Thus it shows that there is stastsical significant difference in LOWER EXTREMITY FUNCTIONAL SCALE of Group A from WEEK 0 to Week 6 i.e, accepting the alterative hypothesis (H_1) and rejecting null hypothesis (H_0)

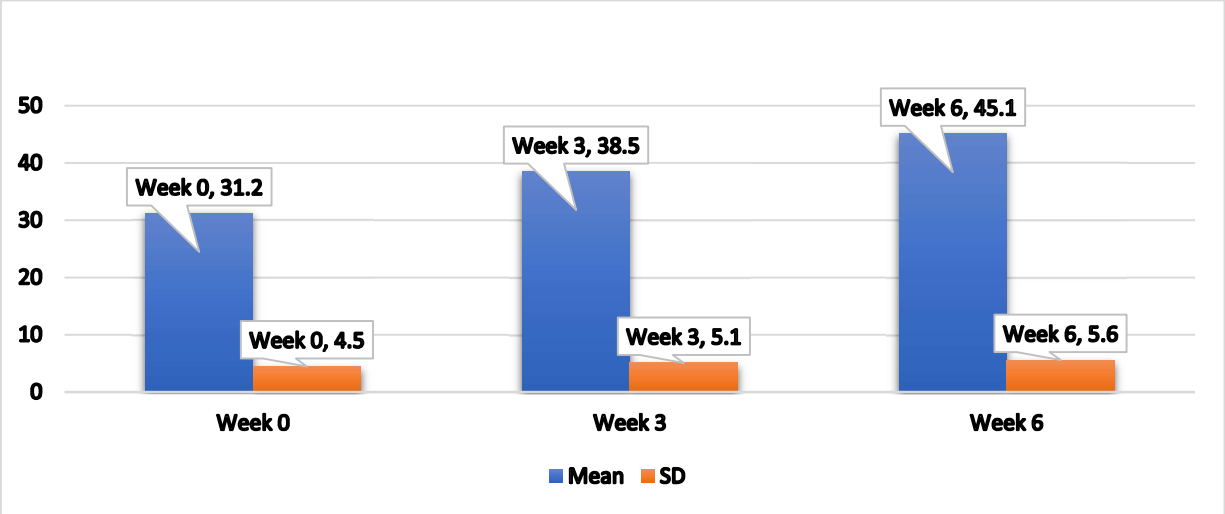


Fig. 7 Comparison within Group B showing Mean±SD of LOWER EXTREMITY FUNCTIONAL SCALE.

VISUAL ANALOUGE SCALE (GROUP B)

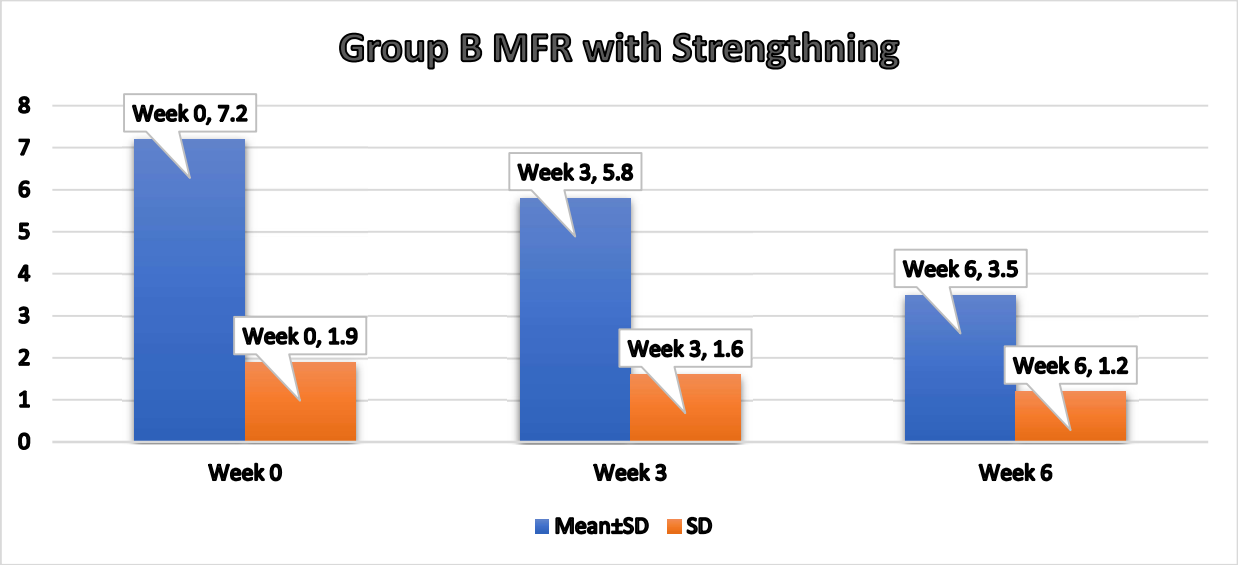
Duration	Mean±SD	p value	Result
Week 0	7.2 ± 1.9	-	-
Week 3	5.8 ± 1.6	0.023	significant
Week 6	3.5 ± 1.2	0.005	Highly Significant

Table 8:. Comparison within Group B showing Mean±SD of VISUAL ANALOUGE SCALE

Scale at Week 0, Week 3, Week 6.

To analyze the difference in the VISUAL ANALOUGE SCALE within Group using non parametric test. The difference in VISUAL ANALOUGE SCALE score measurements from Week 0, week 3 and week 6 were as WEEK 0 Mean±SD 7.2 ± 1.9 , WEEK 3 Mean±SD 5.8 ± 1.6 , and at WEEK 6 Mean±SD 3.5 ± 1.2

It was found that the p value was 0.05 shows significant stastical improvement in subjects within weeks. Thus it shows that there is stastsical significant difference in VISUAL ANALOUGE SCALE of Group A from WEEK 0 to Week 6 i.e, accepting the alterative hypothesis (H_1) and rejecting null hypothesis (H_0)



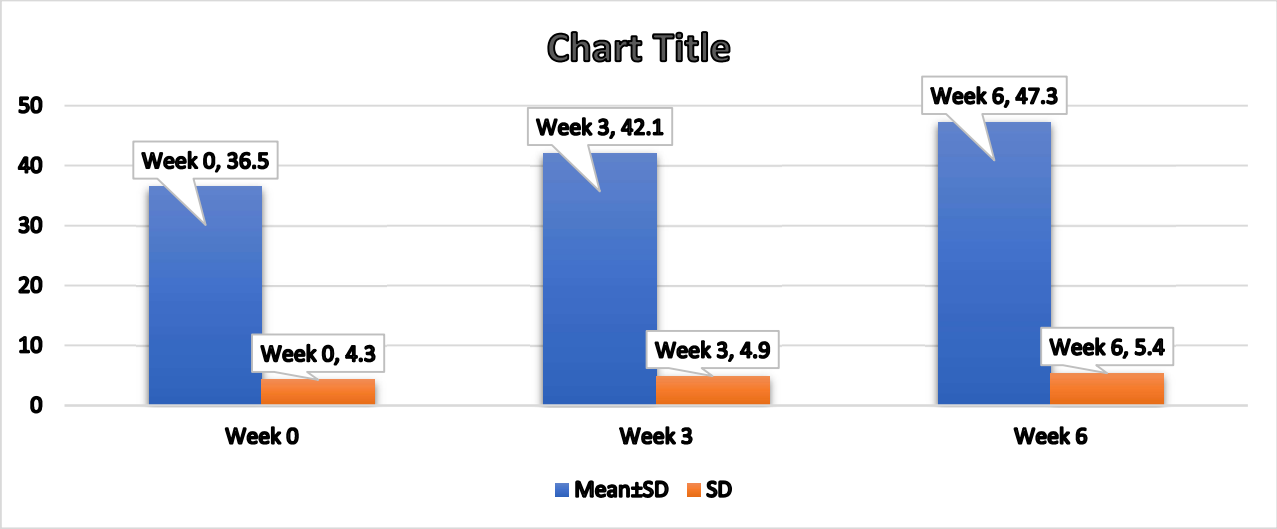
* Fig. 8. Comparison within Group B showing Mean±SD of VISUAL ANALOUGE SCALE RANGE OF MOTION (GROUP B)

Duration	Mean±SD	p value	Result
Week 0	36.5 ± 4.3 (28-42)	-	-
Week 3	42.1 ± 4.9 (35-48	0.049	significant
Week 6	47.3 ± 5.4 (41-54)	0.015	Significant

Table 9. Comparison within Group B showing Mean±SD of RANGE OF MOTION Scale at Week 0, Week 3, Week 6.

To analyze the difference in the RANGE OF MOTION within Group using non parametric test. The difference in RANGE OF MOTION score measurements from Week 0, week 3 and week 6 were as WEEK 0 Mean±SD 36.5 ± 4.3 , WEEK 3 Mean±SD 42.1 ± 4.9 , and at WEEK 6 Mean±SD 47.3 ± 5.4.

It was found that the p value was 0.05 shows significant stastical improvement in subjects within weeks. Thus it shows that there is stastsical significant difference in RANGE OF MOTION of Group A from WEEK 0 to Week 6 i.e, accepting the alterative hypothesis (H_1) and rejecting null hypothesis (H_0)



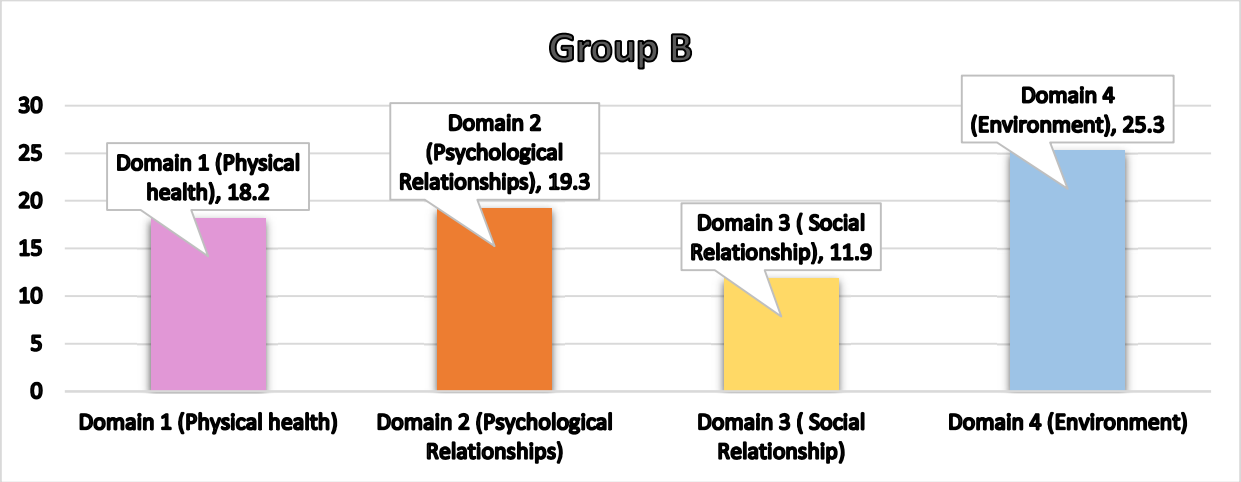
* Fig. 9. Comparison within Group B showing Mean±SD of RANGE OF MOTION

WHO QUALITY OF LIFE BREF QUESTIONNARIE (GROUP B WEEK 0)

Domain	mean	SD	P value	Result
Domain 1 (Physical health)	18.2	3.9	0.028	significant
Domain 2 (Psychological Relationships)	19.3	4.6	0.041	Significant
Domain 3 (Social Relationship)	11.9	3.3	0.921	Not significant
Domain 4 (Environment)	25.3	5.2	0.053	Not significant

Table 10. Comparison within Group B showing Mean±SD of WHO QUALITY OF LIFE BREF QUESTIONNARIE Scale at Week 0

To analyze the difference in the WHO QUALITY OF LIFE BREF QUESTIONNARIE within Group using non parametric test. The difference in WHO QUALITY OF LIFE BREF QUESTIONNARIE score measurements between domains from Week 0, Domain 1 Mean±SD 18.2± 3.9, Domain 2 Mean±SD 19.3± 4.6 , Domain 3 Mean±SD 11.9± 3.3, Domain 4 Mean±SD 25.3± 5.2



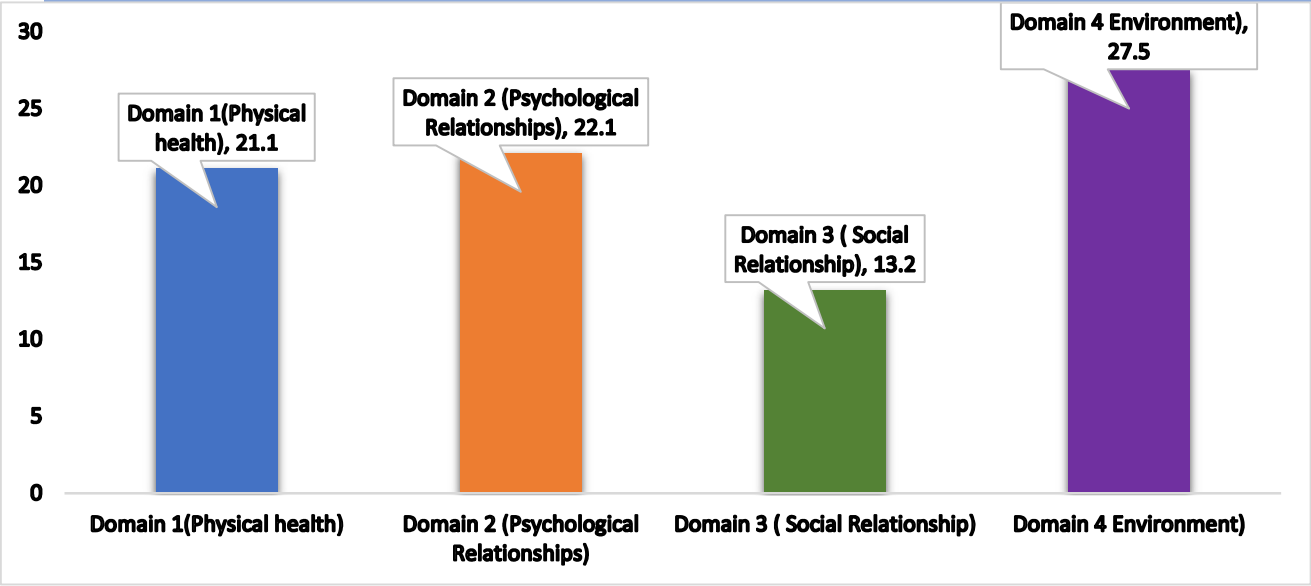
* Fig. 10. Comparison within Group B showing Mean±SD of WHO QUALITY OF LIFE BREF QUESTIONNARIE

WHO QUALITY OF LIFE BREF QUESTIONNARIE (GROUP B WEEK 3)

Domain	mean	SD	P value	Result
Domain 1(Physical health)	21.1	4.1	0.018	significant
Domain 2 (Psychological Relationships)	22.1	4.9	0.031	Significant
Domain 3 (Social Relationship)	13.2	3.6	0.156	Not significant
Domain 4 Environment)	27.5	5.6	0.065	Not significant

Table 11. Comparison within Group B showing Mean±SD of WHO QUALITY OF LIFE BREF QUESTIONNARIE Scale at Week 3

To analyze the difference in the WHO QUALITY OF LIFE BREF QUESTIONNARIE within Group using non parametric test. The difference in WHO QUALITY OF LIFE BREF QUESTIONNARIE score measurements between domains from Week 0, Domain 1 Mean±SD 21.1± 4.1, Domain 2 Mean±SD 22.1± 4.9 , Domain 3 Mean±SD 13.2± 3.6, Domain 4 Mean±SD 27.5± 5.6.

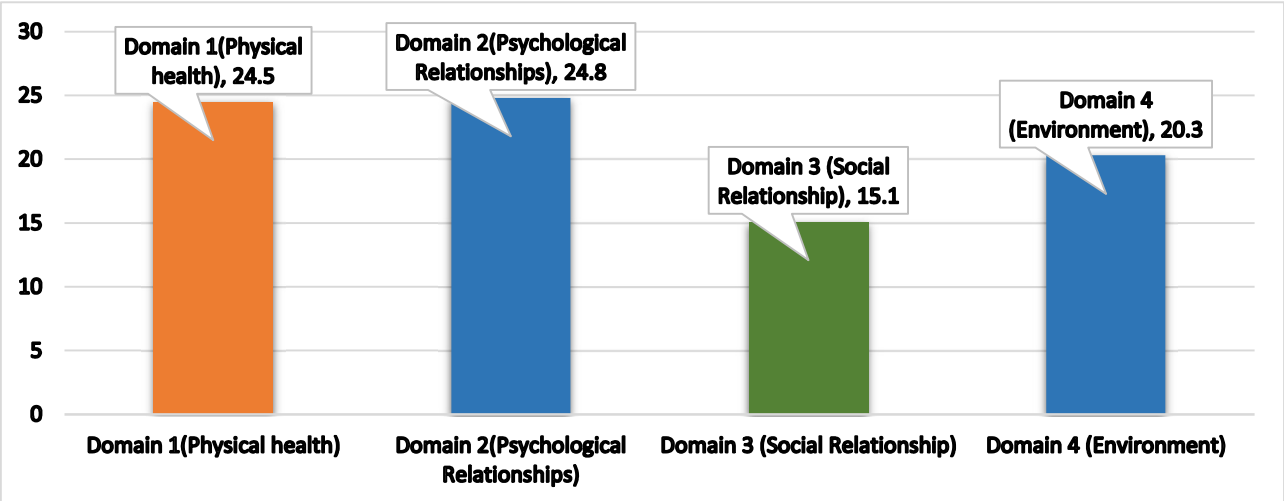


* Fig. 11. Comparison within Group B showing Mean±SD of WHO QUALITY OF LIFE BREF QUESTIONNARIE WHO QUALITY OF LIFE BREF QUESTIONNARIE (GROUP B WEEK 6)

Domain	mean	SD	P value	Result
Domain 1(Physical health)	24.5	4.5	0.012	significant
Domain 2(Psychological Relationships)	24.8	5.1	0.023	Significant
Domain 3 (Social Relationship)	15.1	4.1	0.219	Not significant
Domain 4 (Environment)	20.3	5.8	0.082	Not significant

Table:- 12: Comparison within Group B showing Mean±SD of WHO QUALITY OF LIFE BREF QUESTIONNARIE Scale at Week 6

To analyze the difference in the WHO QUALITY OF LIFE BREF QUESTIONNARIE within Group using non parametric test. The difference in WHO QUALITY OF LIFE BREF QUESTIONNARIE score measurements between domains from Week 0, Domain 1 Mean±SD 24.5± 4.5, Domain 2 Mean±SD 24.8± 5.1 , Domain 3 Mean±SD 15.1± 4.1, Domain 4 Mean±SD 20.3± 5.8.



* Fig. 12. Comparison within Group B showing Mean±SD of WHO QUALITY OF LIFE BREF QUESTIONNARIE

ANALYSIS COMPARING GROUP A AND GROUP B

Comparing Group A and Group B (Lower Extremity Functional Test, Visual Analouge Scale, Range of Motion)

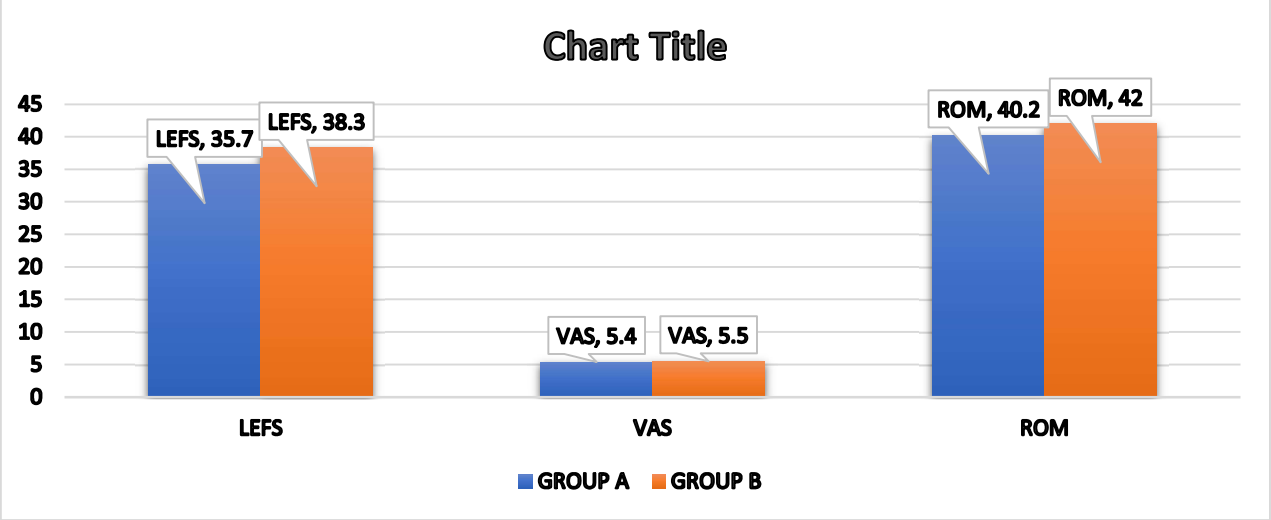
Variable	GROUP A	GROUP B	P value
LEFS	35.7 ± 5.1	38.3 ±5.4	0.021
VAS	5.4 ±1.4	5.5±1.5	0.039
ROM	40.2±4.6	42.0±4.9	0.028

Table 13: Comparing Group A and Group B (Lower Extremity Functional Test, Visual Analouge Scale, Range of Motion)

To analyze the difference in the LOWER EXTREMITY FUCTIONAL SCALE, VISUAL ANALOUGE SCALE AND RANGE OF MOTION between Groups (Group A and Group B) using non parametric test. The difference in LOWER EXTREMITY FUCTIONAL SCALE, VISUAL ANALOUGE SCALE AND RANGE OF MOTION score measurements from Week 0 to week 6. Group A LEFS Mean±SD 35.7 ± 5.1, VAS Mean±SD 5.4 ± 1.4 , and ROM Mean±SD 40.2 ± 4.6. Group B LEFS Mean±SD 38.3 ± 5.4, VAS Mean±SD 5.5 ± 1.5 , and ROM Mean±SD 42.0 ± 4.9. It was found that the p value was 0.05 shows significant stastical improvement in subjects within weeks. Thus it shows that there is stastsical significant difference in both the Groups (Group A and Group B) from WEEK 0 to Week 6 i.e, accepting the alterative hypothesis (H_1) and rejecting null hypothesis (H_0)

Result suggested that both interventions lead to significant improvements in LEFS (Lower Extremity Functional Scale) scores, VAS (Visual Analog Scale) scores, and ROM (Range of Motion) measurements.

MFR with strengthening (Group B) shows slightly greater improvements in LEFS scores and ROM measurements compared to MET with stretching (Group A)



* Fig. 14 Comparing Group A and Group B (Lower Extremity Functional Test, Visual Analouge Scale, Range of Motion)

Comparing Group A and Group B WHO QUALITY OF LIFE BREF QUESTIONNARIE

DOMAIN	GROUP A		GROUP B		
	Mean	SD	Mean	SD	p value
Domain 1(Physical health)	20.3	4.1	21.3	4.3	0.028

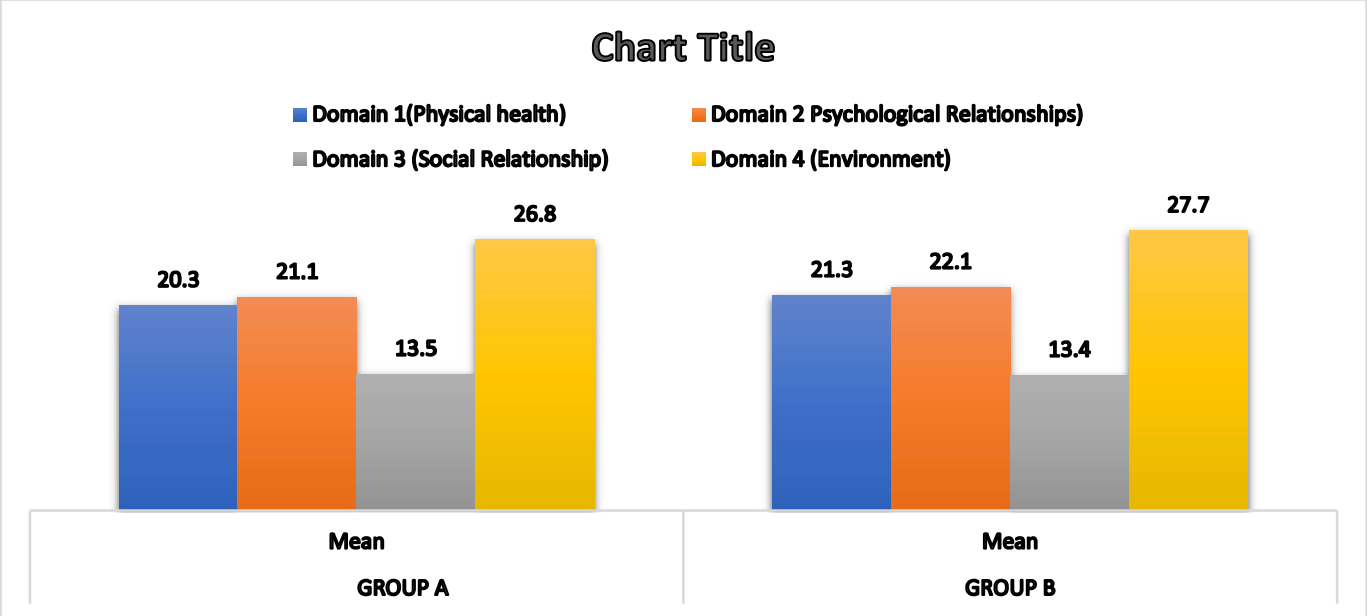
Domain 2 Psychological Relationships)	21.1	4.5	22.1	4.8	0.041
Domain 3 (Social Relationship)	13.5	3.4	13.4	3.6	0.923
Domain 4 (Environment)	26.8	5.1	27.7	5.5	0.053

Table 15: Comparing Group A and Group B Comparing Group A and Group B WHO QUALITY OF LIFE BREF QUESTIONNARIE Domain wise.

To analyze the difference in the WHO QUALITY OF LIFE BREF QUESTIONNARIE within Group using non parametric test. The difference in WHO QUALITY OF LIFE BREF QUESTIONNARIE score measurements between domains Between Group A and Group B. Group A Domain 1 Mean±SD 20.3± 4.1, Domain 2 Mean±SD 21.1± 4.5 , Domain 3 Mean±SD 13.5± 3.4, Domain 4 Mean±SD 26.8± 5.1. Group B Domain 1 Mean±SD 21.3± 4.3, Domain 2 Mean±SD 22.1± 4.8 , Domain 3 Mean±SD 13.4± 3.6, Domain 4 Mean±SD 27.7± 5.5.

The results suggest that Group B performs better than Group A in Domains 1 and 2, with consistent significant differences across all time points. In contrast, no significant differences are found in Domain 3, and mixed results are observed in Domain 4.

These findings may indicate that the intervention or treatment received by Group B has a positive impact on Domains 1 and 2, but not on Domain 3.



* Fig. 15: Comparing Group A and Group B Comparing Group A and Group B WHO QUALITY OF LIFE BREF QUESTIONNARIE Domain wise.

DISCUSSION

This study investigated the effectiveness of two interventions, muscle energy technique with stretching and myofascial release with strengthening exercises, in managing piriformis syndrome. The findings suggest that both interventions are

effective in reducing pain intensity, improving range of motion, increasing muscle strength, and enhancing functional ability.

The muscle energy technique with stretching intervention may be particularly beneficial for individuals with piriformis syndrome who experience significant pain and limited range of motion. This intervention directly addresses the piriformis muscle and surrounding soft tissues, reducing muscle spasm and tension, and leading to improved pain outcomes and increased mobility (Niraj Kumar, et al. 2023).

On the other hand, the myofascial release with strengthening exercises intervention may be more suitable for individuals with piriformis syndrome who have weakness and instability in the affected hip. This intervention targets the surrounding soft tissues and strengthens the muscles, improving muscle function and reducing pain, leading to enhanced functional ability and overall quality of life (Sarmitha, R., et al. 2020).

In this study firstly, Normality was calculated using Shapiro wilk test then after this non parametric test was applied. Kruskal-Wallis test was applied to analyse within the groups data and Mann Witney test was applied to rule out data analysis of between the group data. Thereafter the correlation between the interventions was ruled out.

Both groups showed significant improvements in LEFS scores, VAS scores, and ROM measurements over time. But Group B showed slightly greater improvements in LEFS scores and ROM measurements compared to Group A.

Significant differences were found between Group A and Group B in LEFS scores (p-value: 0.021), VAS scores (p-value: 0.039), and ROM measurements (p-value: 0.028), with Group B showing better outcomes. Quality of life domain scores showed significant differences between Group A and Group B in Domain 1 (Physical health) and Domain 2 (Psychological Relationships), with Group B showing better outcomes.

Overall, the study suggests that both interventions are effective in improving outcomes for patients with Piriformis Syndrome, but MFR with strengthening (Group B) is more effective in improving LEFS scores, ROM measurements, and QOL domain scores compared to MET with stretching (Group A).

The lack of significant differences between groups for any outcome measure may be due to several factors, including the small sample size and short duration of the intervention. Additionally, both interventions may have had a similar impact on the underlying pathophysiology of piriformis syndrome, leading to comparable outcomes.

The results of this study have important implications for clinical practice, suggesting that clinicians can use either muscle energy technique with stretching or myofascial release with strengthening exercises as effective interventions for piriformis syndrome. However, the choice of intervention should be based on individual patient needs and preferences, as well as the clinician's expertise and experience.

CONCLUSION:

This study suggests that both muscle energy technique with stretching and myofascial release with strengthening exercises are valuable interventions for managing piriformis syndrome, with improvements observed in pain intensity, range of motion, muscle strength, and functional ability. However, the findings indicate that muscle energy technique with stretching may be superior for reducing pain, whereas myofascial release with strengthening exercises may be more effective for enhancing range of motion, muscle strength and functional performance. Additional research is needed to confirm these findings and inform evidence-based treatment decisions.

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