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Influence of Active Release Technique, Myofascial Trigger Point Release and Stretching to Reduce Pain among Subjects with Piriformis Syndrome - A Pilot Study

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Abstract: ***Piriformis syndrome is myofascial dysfunction syndrome which causes pain not only because of trigger points within the muscle but also due to peripheral neuritis of sciatic nerve. In order to identify effective treatment ART, MFR and stretching is applied.Theeffectiveness of ART, MFR and stretching to reduce pain among subjects with piriformis syndrome was examined. Study design was quasi experimental study design with pre and post test evaluation.30 Subjects wih the age group of 20 to 30 years were selected according to inclusion and exclusion criteria.The subjects were randomly allocated into three groups by using concealed envelop method. The study was conducted at outpatient department of Vel's School of physiotherapy. The study was done in 2 weeks of duration.Stretch group, MFR group and ART group shows after 2 weeks there were a significant reduction in VAS.ART group showed better result when it was compared with stretch group and MFR technique group.While this study revealed within group differences in VAS in all groups and between group differences in ART technique reveal positive effects of pain reduction and suggest that ART may offer a potential advantage of this mode over other groups.***

Keywords: ART - Active release technique, MFR - Myofascial trigger point release, Piriformis syndrome, Stretching, VAS - Visual analog scale

1. Introduction

Piriformis syndrome is defined as collection of symptoms and signs of pain which arises from piriformis muscle, with or without sciatic nerve entrapment (Cummings, TM, 2000).This syndrome presents as pain and localized tenderness around the gluteal region at the area of piriformis muscle and is usually described as a deep, aching type of pain with or without radiating signs and symptoms (Durrani et al., 1991 and Windisch et al., 2007).This syndrome occurs most frequently among populations in their fourth and fifth decade of life and affects individuals regardless of type of occupations and level of activity.

The reported prevalence of piriformis syndrome among chronic low back pain patients varies widely, between 5% and 36% (Foster, MR, 2002 and Benson et al., 1999).

Piriformis syndrome is often underscored in the differential diagnosis of chronic hip, buttock, and low back pain as it is frequently unrecognized or is misdiagnosed in clinical settings (Fishman and Schaefer, 2003).Of the many diagnostic techniques, the Flexion Adduction Internal Rotation (FAIR) technique had shown high specificity and sensitivity when used in combination with functional electromyography examination (Fishman et al., 2002 and Filler et al., 2005).

Tenderness at the gluteal region around the piriformis muscle (Lase`gue sign) has been noted to be the most consistent clinical finding in piriformis syndrome (Durrani et al., 1991).

2. Background of the Study

The active release technique (ART) is a manual therapy for the recovery of soft tissue function, which can cause pain, stiffness, muscle weakness, and abnormal sensations including mechanical dysfunction in the muscles, myofascia, and soft tissue(Tak et al., 2013)

Active release technique has three unique objectives: Restoring free and unimpeded movement of soft tissue, The release of entrapped nerves, vasculature and lymphatic, and to re-establish optimal texture, resilience and function of soft tissues (Scott howitt et al., 2006).

Myofascial release (MFR) is a form of manual therapy which involves the application of a low load, long duration stretch to the myofascial complex, intended to restore optimal length, decrease pain, and improve function.

Static stretching is a commonly used method of stretching in which soft tissue are elongated just past the point of tissue resistance and then held in the lengthened position with a sustained stretch force over a period of time.

Therefore, the purpose of this study was to compare the influence of ART, MFTPR and Stretching on the visual analog scale (VAS) score in patients with piriformis syndrome, with the aim of elucidating additional information

on their effects and identifying more efficient treatments that can be used in clinical settings.

2.1 Aim of the Study

The aim of the study was to find out the influence of active release technique, myofascial trigger point release and stretching to reduce pain among subject with piriformis syndrome.

2.2 Need of the Study

The recent studies had suggested that the implication of manual therapy and stretching is beneficial for patients with piriformis syndrome, both reducing the symptoms and improving function. The effectiveness of ART has been reported for reducing pain and increasing ROM in patients with carpal tunnel syndrome, Achilles tendonitis, tennis elbow, and hamstring tightness. Hence, the need of the study was my own interest to compare and evaluate the effectiveness of ART, MTPR and stretching in reducing pain among subjects with piriformis syndrome.

2.3 Objectives of the Study

- To examine the effectiveness of Active release technique to reduce pain among subjects with piriformis syndrome.
- To examine the effectiveness of Myofascial trigger point release to reduce pain among subjects with piriformis syndrome.
- To examine the effectiveness of Stretching to reduce pain among subjects with piriformis syndrome.
- To compare the effectiveness of Active release technique, Myofascial trigger point release and Stretching to reduce pain among subjects with piriformis syndrome.

2.4 Hypothesis

Null Hypothesis
There would not have been any significant improvement in reduction of pain in all the three group.

Alternate Hypothesis
There would have been significant improvement in reduction of pain in all the three group.

3. Reviews of Literature

Jun Ho Kim et al., (2015):
In his study on effects of the active release technique on pain and range of motion of patients with chronic neck pain. Twenty-four individuals with chronic neck pain were randomly and equally assigned to 3 groups: an ART group, a joint mobilization (JM) group, and a control group. Before and after the intervention, the degree of pain, PPT, and ROM of the neck were measured using a VAS, algometer, and goniometer. Finally the study concluded that the ART for the treatment of chronic neck pain may be beneficial for neck pain and movement.

Sajin Tak et al., (2013):
His research topic is on the effects of active release technique on the gluteus medius for pain relief in persons with chronic low back pain. Twelve patients with chronic low back pain were participated in this study. Subjects in ART group were received 2 times a week for 3 weeks treatments with either ART on gluteus medius muscle trigger points. Outcome measures were conducted by pain intensity with a pain visual analog scale. Their results suggest that the response to ART may be usable to treat low back pain. ART was presented to reduce pain level of low back in people with chronic low back pain.

Ajimsha, et al., (2016)
He did the study on Effectiveness of Myofascial Release Technique in the Management of Non-Specific Low Back Pain in Nursing Professionals. 57 individuals who met the inclusion criteria and provided written informed consent were randomized to the Myofascial release technique (MFR) or to the control arm (Sham MFR) of the study. This study provides evidence that Myofascial release technique can be a useful tool in the management of NSLBP in nursing professionals than a sham myofascial release technique.

Magesh Anand Doraisamy, et al., (2011)
He did the study on effect of upper trapezius latent myofascial trigger points on neck pain and disability with 42 subjects with upper trapezius trigger pain. Twenty seven people (22 women and 5 men, age range 18 to 22 years, mean age 19.62 +/- 1.33 years) were in the experimental group and Fifteen people (10 women and 5 men, age range 18 to 23 years, mean age 18.86 +/- 1.55 years) were in the control group. The results showed that the neck pain and disability is significantly higher in people with latent MTrP than the people without Latent MTrP. His study finally concluded that the latent MTrP despite of being quiescent might have a significant role to play in influencing neck pain and disability.

Brett M. Gulledge, et al.,
His research thesis is on comparison of two stretching methods and optimization of stretching protocol for the piriformis muscle.

Seven subjects underwent three CT scans: one supine, one with hip flexion, adduction, then external rotation (ADD stretch), and one with hip flexion, external rotation, then adduction (ExR stretch). A computer program was developed to map PiM length over a range of hip joint positions and was validated against the measured scans.

External Rotation and Adduction stretches elongate the PiM similarly and therefore may have similar clinical effectiveness. The optimized stretches led to larger increases in PiM length and may be more easily performed by some patients due to increased hip flexion.

4. Methodology

Study Design
Quasi experimental study design with pre and post test evaluation.

Study Setting
The study was conducted at outpatient department of PPG College of Physiotherapy.

Sample Size
30 subjects with piriformis syndrome with age group ranges between 20 to 30 years were selected for this study.

Sampling Method
The subjects were randomly allocated into three groups by using concealed envelop method.

Study Duration
The study duration was 2 weeks.

Selection Criteria:

Inclusion criteria:
- Age group ranges between 20 to 40 were included.
- Both the genders were included.
- Secondary piriformis syndrome

Exclusion criteria:
- Hip joint (articular) pathology including pain, fracture, instability
- Lumbar Disc herniation,
- Lumbar Spondylosis,
- Trochanteric bursitis
- Lumbar Spinal stenosis
- Sacroiliac joint dysfunction.
- Bilateral piriformis syndrome.

5. Materials

- Informed consent
- Patient information sheet
- Visual analog scale
- Tennis ball
- Stop watch
- Couch

5.1 Procedure

- The subjects were screened based on the inclusion and exclusion criteria.
- The purpose of the study was explained to them and their voluntary decision to participate was asked.
- The informed consent was obtained.
- The subjects were randomly allocated by concealed envelop method into three groups.
- The subjects in group A were treated with Active release technique and the group B were treated with Myofascial trigger point release and the group C were treated with Stretching exercise.
- Activities were given for 30 minutes per session for 5 days in a week for 2 weeks.
- The subjects were re -assessed after the study by another therapist to know the outcome by using Visual analogue scale.

5.2 Active Release Technique

Client's Position:
Supine with hips and knees bend.

Technique:
By using a tennis ball at the area of release (between the posterior superior iliac spine and the greater trochanter, the client was asked to slowly press the body against the ball in a way that it elicits an aching pain the region. The body has to be adjusted by using the weight transferred through the feet to roll the ball between the above positions. The client has to stop the rolling for 30 seconds at any point where he/she feels more pain. 5 repetition per session for 5 days in a week for 2 weeks.

5.3 Myofascial Trigger Point Release

Patient position
Prone lying

Therapist position
The therapist stands at the patient's side, perpendicular to the patient.

Execution:
1) Using the palm of the hand, the therapist applies gentle pressure at mid buttock, which is the general location of the mid belly of the piriformis. The leg is gently externally rotated to put the piriformis on slack. The pressure is gently increased until the level of the piriformis is reached. A sustained pressure is applied, provided the pressure does not create an increase in tone. As the piriformis relaxes, more pressure can be progressively applied.
2) The same sustained pressure may be applied to the piriformis using the elbow. The elbow allows for more localized pressure to be applied. The same principle applies in that as the piriformis releases and as the pain decreases, more pressure can be applied.

It was performed for 3 to 4 repetition per session for 5 days in a week for 2 weeks.

5.4 Stretching

Clients position
Supine lying

Technique
Lie on the back both feet flat on the floor and both the knee bent. Rest the ankle of the right leg over the knee of the left leg. Pull the left thigh towards the chest and hold the stretch. Repeated for each side.

Each stretches should be held for 20 seconds. 5 to 10 stretches are done and repeated two times per day.

Demographical Data

Variables	ART	MFTPR	Stretching
Age	27 ± 1.3	28 ± 1.0	26 ± 2.3
Right Side Involvement	6 ± 1.3	5 ± 2.2	7 ± 1.2
Left Side Involvement	4 ± 2.5	5 ± 2.0	3 ± 1.2

Within Group Analysis of Pain in VAS

Groups		MEAN ± STD ERROR MEAN	p
ART	Pre	7. 0 ± **0.185**	0
	post	5.5 ± **0.167**	
MFT	Pre	7.1 ± **0.108**	0
	Post	5.9 ± **0.094**	
Stretching	Pre	7.4 ± **0.292**	0
	post	5.3 ± **0.279**	

Between Group

- Between group analysis done by one way ANOVA
- Base line homogenicity proved with p value o.342 in VAS. (*P > .05).*

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
VAS pre value	Between Groups	.373	2	.187	.245	.784
	Within Groups	11.547	27	.761		
	Total	12.920	29			
VAS post value	Between Groups	9.740	2	4.870	7.824	.002
	Within Groups	10.807	27	.622		
	Total	13.547	29			

6. Data Analysis and Results

Within group analysis (Pre - post analysis) was done by paired 't' test. Between group analysis was done by one way ANOVA test.

There was significance changes found after intervention which was analyzed with boneferroniposthoc.

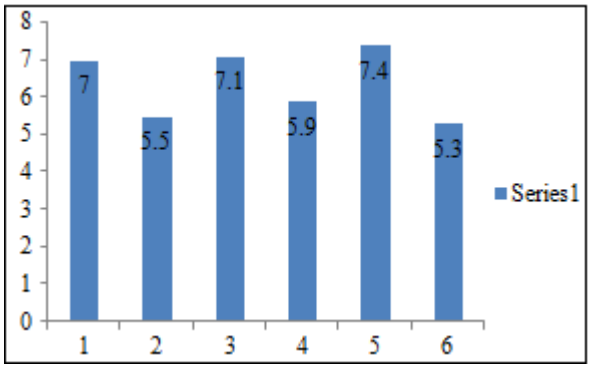
- Group A and Group C showing highly significant with P value 0.002 (*P > .05).*
- Group B and Group C showing significant with P value 0. 046 (*P > .05).*

Bonferroni**Multiple Comparisons**							
Dependent Variable	(I) group	(J) group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
VAS Pre Value	1.00	2.00	.25400	.39012	1.000	-.7418	1.2498
		3.00	.04000	.39012	1.000	-.9558	1.0358
	2.00	1.00	-.25400	.39012	1.000	-1.2498	.7418
		3.00	-.21400	.39012	1.000	-1.2098	.7818
	3.00	1.00	-.04000	.39012	1.000	-1.0358	.9558
		2.00	.21400	.39012	1.000	-.7818	1.2098
VAS Post Value	1.00	2.00	.45900	.35284	.613	-.4416	1.3596
		3.00	**1.37100***	**.35284**	**.002**	**.4704**	**2.2716**
	2.00	1.00	-.45900	.35284	.613	-1.3596	.4416
		3.00	**.91200***	**.35284**	**.046**	**.0114**	**1.8126**
	3.00	1.00	**-1.37100***	**.35284**	**.002**	**-2.2716**	**-.4704**
		2.00	**-.91200***	**.35284**	**.046**	**-1.8126**	**-.0114**
*. The mean difference is significant at the 0.05 level.							

7. Results

- Stretch group, MFR group and ART group shows after 2 weeks there were a significant reduction in VAS.
- ART group showed better result when it was compared with stretch group and MFR technique group

8. Graphical Representation



9. Discussion

The Piriformis syndrome is a neuromuscular condition characterized by low back, buttock and leg pain. It often results in compressing the sciatic nerve, leading to peripheral radiculopathy of the ipsilateral lower limb. Common feature including tenderness over the greater sciatic notch and aggravation of the symptoms with sitting and stretching of the piriformis muscle.

Piriformis syndrome is thought to be more prevalent in women than men, possibly because of biomechanics associated with the wider quadriceps femoris muscle angle in the coxae of women.
Piriformis syndrome occurs most frequently during the fourth and fifth decades of life and affects individuals of all occupations and activity level.

The piriformis muscle act as a external rotator, weak abductor and weak flexor of the hip, providing postural stability during ambulation and standing.

Congenital anatomical variations in both the sciatic and piriformis muscle is found in 15% to 30% of the population. Common variations includes proximal bifurcation of the sciatic nerve, resulting in the tibial branch passing either superiorly or inferiorly to the piriformis muscle and the sciatic nerve passing posteriorly or superiorly to the inside of the piriformismuscle.

Boyajian o neill et al., described piriformis syndrome as either primary or secondary in etiology. Piriformis syndrome is due to the anatomical variants, secondary piriformis syndrome results from micro trauma, overuse and ischemic effect.

The most common symptoms includes pain with sitting, standing and lying longer than 20 minutes. Pain or paraesthesia radiating from the sacrum to the gluteal region and down to the posterior thigh.

Pain decreases wit ambulation and pain when rising from a seated position. Common signs includes tenderness in the SI joint, sciatic notch, the piriformis muscle, asymmetrical weakness in the affected limb and restriction of Range of motion. Through compensatory or facilitative mechanism, piriformis syndrome may contribute to cervical, thoracic and lumbosacral pain, as well as gastrointestinal disorder and head ache.

Several clinical test can be used to aid the diagnosis of piriformis syndrome. Though these is no single test specific to piriformis syndrome. Electromyography examinations that incorporate active maneuvers such as the FAIR test may have greater specificity and sensitivity than other available tests for diagnosis of piriformis syndrome.

Still the diagnosis of the piriformis syndrome remains controversial.

The goal of our study in the treatment of piriformis syndrome is to decrease pain and to restore the normal ROM.

In deciding which modalities to use, it is important for clinicians to keep in the mind the following factors: Does the patient have a primary or secondary piriformis involvement, acute inflammatory or chronic fibrosis or functional or structural implications.

Fligg, goes on to argue that stretching may increase the inflammatory response, thereby further entrapping the sciatic nerve. For chronic cases, either indirect or direct pressure techniques may be applied.

Maxwell, describe using trigger point therapy in acute phase. This can be accomplished by applying a constant heavy thumb, ultrasound or muscle stimulator over the affected area approximately 30 seconds or until spasm is released. Applying 30 Rbs of pressure over the affected area has been found to be the most effective method of release [14].

Active release technique perhaps the most popular of the soft tissue therapy/ Mobilization utilized by manual therapist.

ART is a non-invasive soft tissue treatment process that both locates and breaks down the scar tissue and adhesive which cause pain, stiffness, weakness, numbness and physical dysfunction.

This study examined the effect of ART on pain reduction in piriformis syndrome.

If tissues are damaged, there are healing responses in them. They are completed by immune responses. The immune system protects them from infection and clears the wound. The damaged region get to be restored. Inflammation and acute pain occur. Wound tissues or fibrillar connective tissues are related to restoration. There tissues block blood flow and limit MVT. ART recovers movement of all the soft tissues, relaxes entrapped nerves, blood vessels and lymph and restore the proper texture, elasticity, and functions of soft tissues.

Vijay kage et al, in his study immediate effect of Active release technique versus mullligan bend leg raise in subjects with hamstring tightness concluded that single intervention of ART shows better improvement in hamstring flexibility by decreasing pain and increasing range of motion.

ART is a method for treating the soft tissues such as the tendon, nerve and myofascia and is performed for repetitive strain injury, acute injury and functional fixation damage due to abnormal posture maintained over the long limb. Further more ART is effective at resolving adhesion of scar tissue and soft tissues that causes pain, spasm, weakness, tingling and other symptoms.

10. Conclusion

While this study revealed within group differences in VAS in all groups and between group differences in ART technique reveal positive effects of pain reduction and suggest that ART may offer a potential advantage of this mode over other groups.

11. Limitation and Suggestions

a) Further study can be conducted with different age groups.
b) Long term effect should be evaluated.
c) The sample of the study design was small and it can be done on larger sample. The long term effects can be evaluated with these treatments.

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