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Immediate effectiveness of positional release technique and active release technique on hamstring in patients with knee osteoarthritis

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Abstract
Background: There are many physiotherapy interventions used in treatment of osteoarthritis and among them are, positional release technique and active release technique.
Objective: The purpose of this study is to compare and contrast the immediate effectiveness of ART and PRT on hamstring in patients with osteoarthritis knee.
Methodology: 30 patients with osteoarthritis knee were divided into two groups based on selection criteria. Group A received PRT and group B received ART on hamstring. NPRS and active knee flexion ROM using goniometry were used as outcome measures.
Result: On comparing pre to post intervention values in group A and group B, there was significant improvement noted in terms of pain and knee ROM statistically, in both groups, but in comparison not much difference is seen in between both the techniques.
Conclusion: This study concluded that both the groups showed improvement statistically and clinically in terms of pain and knee flexion ROM.

Keywords: effectiveness, hamstring, osteoarthritis

Introduction

Osteoarthritis (OA), the most common degenerative disease, primarily affects the articular cartilage and the subchondral bone of a synovial joint, eventually resulting in joint failure [1]. however, latest evidence has proven that OA is a multifactorial entity which involving multiple causative factors like trauma, mechanical forces, inflammation, biochemical reactions, and metabolic derangements [2].

Treatment provided by physiotherapists can help decrease pain and disability while improving function in individuals with osteoarthritis [4, 5]. Patient education programs related to exercise, healthy diets, and strategies to avoid joint stresses have been shown to be effective for managing symptoms and improving function, in many arthritis care guidelines [6, 7].

Among soft tissue release techniques for OA knee, myofascial release, trigger point release etc. are widely used in the treatment of OA knee [8, 9].

Active release technique is a patented, non-invasive, soft tissue release technique, it's a process that both locates and breaks down the scar tissue and adhesions which cause pain, stiffness, weakness, numbness and physical dysfunctions with repetitive strain injuries [10].

PRT is a method, which is done using tender/trigger points to resolve the dysfunctions like pain and tightness [11]. It is an manual therapy which intent to increase muscular flexibility by placing the muscle in a shortened position which results in muscle relaxation in difference to placing the muscle in a stretched position [12, 13].

Methodology

1. **Study Design:** Experimental
2. **Study Setting:** Dr.BR Ambedkar College of Physiotherapy, Dr.BR Ambedkar Medical College and Hospital, Bangalore 560045.
3. **Criteria for Sample Selection**:

Inclusion Criteria

- Patients with primary knee osteoarthritis
- Aged between 50-65 years
- Both gender (male and female)

- Duration of symptoms between 4-12 months

Exclusion Criteria
- Secondary Knee Osteoarthritis
- Past or present vascular disorder
- Acute or chronic low back pain
- Upper motor neuron lesion and lower motor neuron lesion
- Any history of lower extremity injury in past 3 months.

4. **Sample Size**: 30 participants
5. **Sampling Method**: Simple Random Sampling
6. **Treatment Duration**: 10-15 minutes

7. **Procedure**

The group A and group B were assessed with Numerical Pain Rating Scale and goniometry to assess active flexion of knee range of motion as pre and post outcome measures, followed by administration of the treatment techniques, and were immediately reassessed with the same outcome measures.

Hamstring Postional Release Technique

Patients in Group A received Hamstring Positional Release Technique.

Patient were asked to be in supine lying on the plinth and the affected thigh were extended and abducted off the edge of the table. The therapist flexed the affected knee approximately 40° and then either abduct or adduct the lower leg. Then the tender points were palpated on the posterior, lateral or medial area along the entire length while stretching the leg in different positions. Following which a pressure was applied anteromedially or anteriorly for 90 seconds. The tibia was either internally or externally rotated. This was repeated 3 times in a session with a break of 30 seconds.

Fig 1: Therapist performing knee Positional Release Technique

Hamstring Active Release Technique

Patients in Group B received Hamstring Active Release Technique.

Patient were lying supine on the plinth and gentle tension were applied to the hamstring muscle along the entire length while stretching the leg in different positions. Then gentle tension was applied at the origin and insertion of the hamstring muscle. This is repeated 3 times in a session with a break of 30 seconds.

Fig 2: Therapist performing knee Active Release Technique

Data Analysis

Pre post comparison in knee flexion and NPRS is done using paired t test and between group comparison is done by unpaired t test. Level of significance was set at 5%.

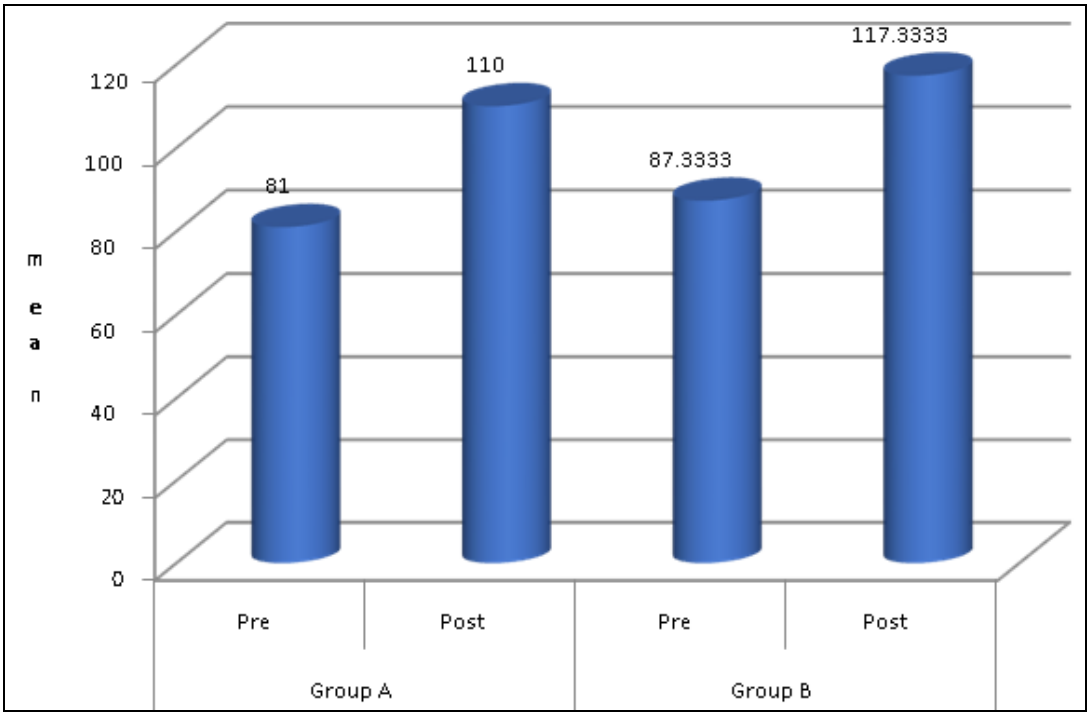
The study consists of 30 subjects divided 15 in each group. In group A and group B 8(53.35%) are female and 7(46.7%) are male.

In group A, average age is 56.4±5.165 years and in group B average age is 55.6±4.563 years. The comparison shows t value=0.449 and p value=0.657 indicating no statistical significance difference between the groups in age.

1. Knee Flexion Rom in Group A and Group B

Table 1: Pre-post comparison of knee flexion in both groups

		Mean	Std. Deviation	Average improvement	t value	Result
Group A	Pre	81.0000	9.67323	29.0	13.224	P<0.05
	Post	110.0000	14.14214			
Group B	Pre	87.3333	7.76132	30.0	13.416	P<0.05
	Post	117.3333	11.62919			



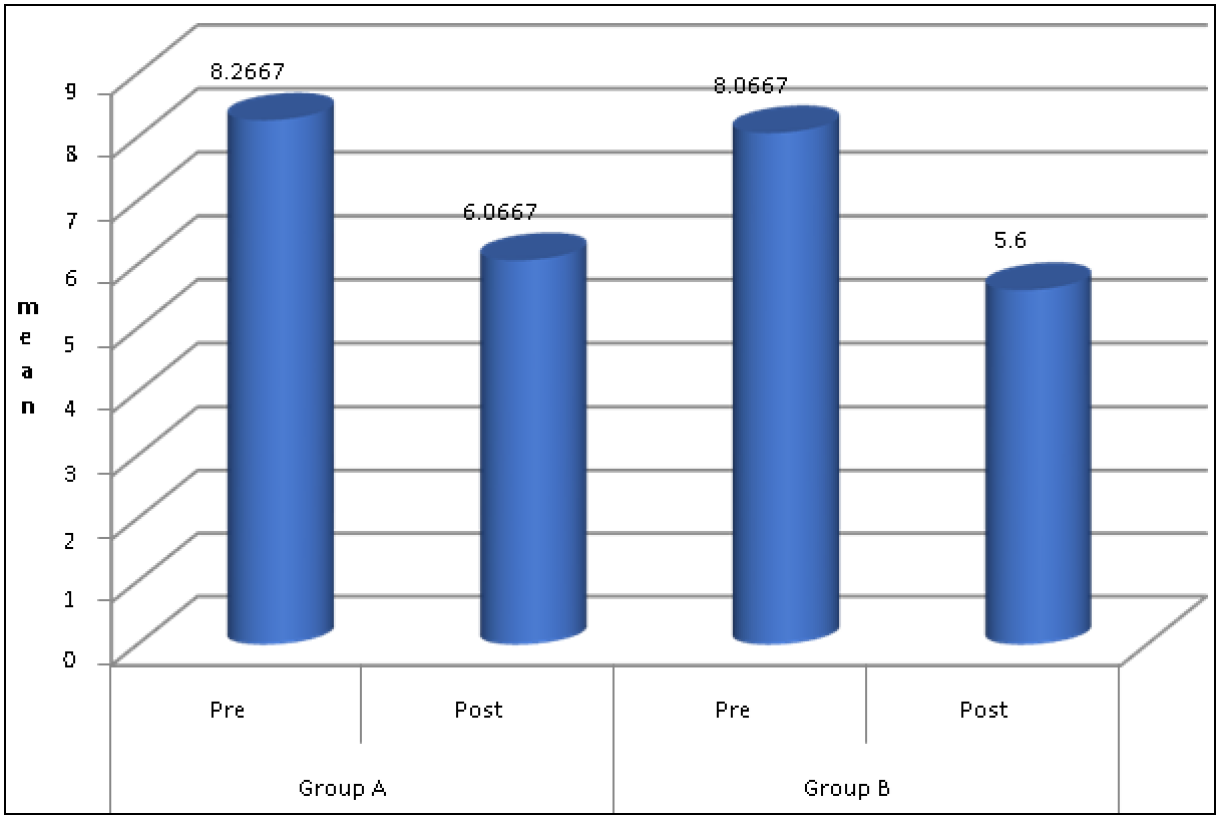
Graph 1: Pre-post comparison of knee flexion in both groups

The comparison shows in group A, average pre knee flexion was 81±9.673 and increased to 110±14.142 after the treatment. The test shows there is significant improvement in knee flexion after the treatment with p<0.05. In group B, average pre knee flexion was 87.33±7.761 and increased to 117.33±11.629 after the treatment. The test shows there is significant improvement in knee flexion after the treatment with p<0.05

2. Numerical Pain Rating Scale in Group A and Group B

Table 2: Pre-post comparison of NPRS in each groups

		Mean	Std. Deviation	Average improvement	t value	Result
Group A	Pre	8.2667	.70373	2.2	9.866	P<0.05
	Post	6.0667	.79881			
Group B	Pre	8.0667	.70373	2.466	14.929	P<0.05
	Post	5.6000	.73679			



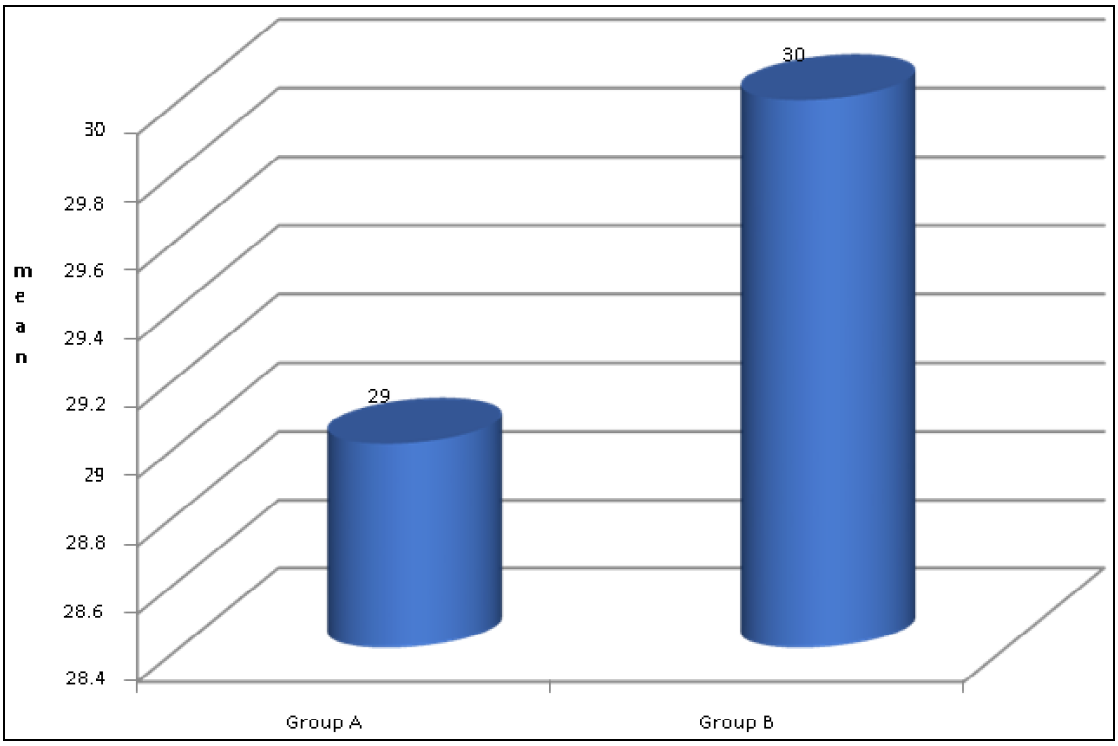
Graph 2: Pre-post comparisons of NPRS in both groups

The comparison shows in group A, average pre NPRS score was 8.266±0.703 and increased to 6.066±0.798 after the treatment. The test shows there is significant improvement in NPRS after the treatment with p<0.05. In group B, average pre NPRS was 8.066±0.703 and increased to 5.6±0.736 after the treatment. The test shows there is significant improvement in NPRS after the treatment with p<0.05.

3. Comparison of Active Knee Flexion Rom Improvement between Group A and Group B.

Table 3: Comparison of active knee flexion between both the groups

Group	Mean	Std. Deviation	t value	Result
Group A	29.0	7.28665	0.798	0.431(p>0.05)
Group B	30.00	8.66025		



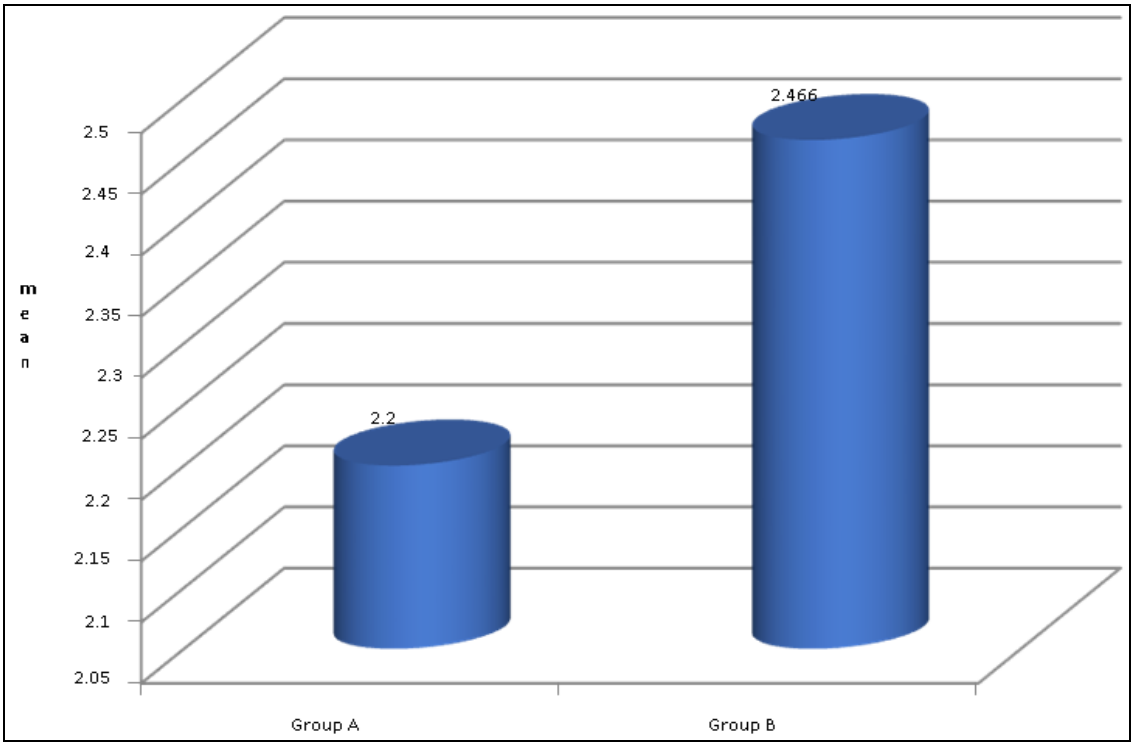
Graph 3: Comparison of active knee flexion between both the groups

The test shows, average improvement of knee flexion in group A is 27.667 and in group B it is 30.0. The t value=0.789 with p>0.05. It shows there is no significant difference between group and group B in knee flexion.

4. Pre-Post Comparsion Of NPRS between Group A And Group B

Table 4: Pre-post Comparison of NPRS between both the groups

Group	Mean	Std. Deviation	t value	Result
Group A	2.200	.861	0.962	0.344(p>0.05)
Group B	2.466	.639		



Graph 4: Pre-post comparison of NPRS between both the groups

The test shows, average improvement of NPRS in group A is 2.2 and in group B it is 2.466. The t value=0.962 with p>0.05. It shows there is no significant difference between group and group B in NPRS

Discussion

On Comparing Group A and Group B, the t value of active knee flexion ROM was 0.192, and the t value of NPRS was 5.063 which showed that there was significant improvement, as per within data there is significant difference.

PRT is thought to decrease tissue tenderness by altering nociceptor activity in the soft tissues. PRT appears to affect inappropriate proprioceptive activity during this phase, thus helping to normalize tone and set the normal length-tension relationship in the muscle. ART locates and breaks down the scar tissue and adhesions which helps to reduce pain, stiffness, weakness, numbness and physical dysfunctions due to repetitive strain injuries. ART also helps to restore optimal tissue texture, tension and movement, strength, flexibility, function, and relative translation between soft tissue layers and release any soft tissue restrictions. ART and PRT reduces fascial tension, joint hypo-mobility and subsequently increase the ROM and decreases the pain.

Conclusion

There was a significant difference seen within the group comparison and there was no significant difference seen on comparison of both the groups.

Limitation and Recommendations

This study showed the immediate effectiveness of the treatment; therefore, it is not possible to know the long-lasting effects of the treatment, for which a study of longer duration can be conducted with a larger sample size.

Implications to Practice

As this study has shown significant improvement in participants who received ART and PRT in terms of pain and ROM, it can be used in the treatment protocol of Osteoarthritis Knee as with its immediate effectiveness, and it may also increase the patient therapist adherence and treatment adherence.

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