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COMPARING THE EFFICACY OF MUSCLE ENERGY TECHNIQUE (MET) AND MYOFASCIAL RELEASE (MFR) WITH HOT PACKS IN PAIN REDUCTION AND STRENGTH IMPROVEMENT IN PATELLAR TENDINOPATHY

Physiotherapy

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ABSTRACT

Background: The objective was to compare the effectiveness of Muscle Energy Technique (MET) and Myofascial Release (MFR) combined with hot pack in reducing pain and improving strength in patients with patellar tendinopathy. **Materials and Methods:** The study design was quasi experimental in nature. Thirty patients with patellar tendinopathy, aged 20-40 years, both males and females were included according to selection criteria after undertaking written informed consent from the patients. These patients were randomly divided into two groups using chit method, Group A [n=15] and Group B [n=15]. Patients were assessed for Pain and Muscle Strength using Visual Analogue Scale(VAS) and MMT respectively. Group A was administered MET with Hot Packs whereas Group B received MFR with Hot Packs. Both groups received interventions for a total of 12 weeks, with 5 sessions per week for 30 minutes. Then the patients were reassessed after completing 12 weeks of interventions. Statistical analysis was done using paired t - test and unpaired t-test. **Results:** The present study revealed statistically significant difference in scores of VAS and MMT in both groups. **Conclusion:** Both MET and MFR proved to be effective treatment approaches for patellar tendinopathy, but MET demonstrated greater improvements in pain relief and muscle strength.

KEYWORDS

MET, MFR, patellar tendinopathy, pain, Muscle strength

INTRODUCTION

Patellar tendinopathy, commonly known as jumper's knee, is a degenerative condition of the patellar tendon that results in pain, dysfunction, and reduced athletic performance.[1] It primarily affects individuals engaged in repetitive jumping and landing activities, leading to chronic overuse injuries.[2] This condition is characterized by tendon thickening, collagen disorganization, and neovascularization, which contribute to persistent pain and reduced muscle strength.[3]

The general and athletes' populations reported an overall prevalence of 0.1% and 18.3%, respectively. In athletes, the prevalence of PT was 11.2% in women and 17% in men.[4] Jumping sports such as volleyball, basketball, and long and high jumps have a high disease prevalence.[5] Several theories about its pathogenesis, including vascular, mechanical, impingement–related causes, have been hypothesised, but the most commonly proposed is chronic repetitive tendon overload.[6] Patellar tendinopathy, one source of anterior knee pain, is most commonly characterized by pain localized to the inferior pole of the patella and load-related pain that increases with the demand on the knee extensors, notably in activities that store and release energy in the patellar tendon.[7]

Muscle Energy Technique (MET) is a manual therapy approach that utilizes voluntary muscle contractions against a controlled resistance to improve muscle length, reduce pain, and enhance strength.[8] MET is particularly useful in managing musculoskeletal disorders by improving blood circulation, decreasing muscle tightness, and enhancing joint mobility.[9] Studies have demonstrated its efficacy in reducing pain and increasing range of motion in various musculoskeletal conditions, including knee pathologies.[10]

Myofascial Release (MFR) is another widely used manual therapy that involves the application of a low load, long duration stretch to the myofascial complex, intended to restore optimal length, decrease pain, and improve function.[11] The application of hot packs as an adjunct therapy has been widely utilized to improve local circulation, reduce muscle stiffness, and facilitate tissue healing .[12] Heat therapy has been found to enhance the effectiveness of manual therapy techniques by promoting tissue extensibility and relaxation.[13]

Despite the growing evidence supporting both MET and MFR in musculoskeletal rehabilitation, limited research compares their relative efficacy in patellar tendinopathy. Therefore, this study aims to compare the effects of MET and MFR, both combined with hot pack application, on pain reduction and muscle strength improvement in individuals with patellar tendinopathy.

Methodology

Thirty-six patient diagnosed with patellar tendinopathy were screened at Pacific Institute of Medical Sciences(PIMS) hospital and Opd of Janardhan Rai College of Physiotherapy, Dabok, Udaipur, Rajasthan.Thirty patients fulfilled the selection criteria and were enrolled in the study. The selected patients had a diagnosis of patellar tendinopathy. The patients included were both males and females, aged 20-40 years. Uncooperative patients, Patient diagnosed with any other pathology rather than Patellar Tendinopathy ,patient with any recent surgery in and around knee joint , hypersensitive skin, patient with any skin disorders and lack of provision of consent to participate were excluded from the study. The Ethical approval was undertaken from the Institutional Ethical Committee, Janardan Rai Nagar Rajasthan Vidyapeeth University prior to the beginning of the study. The demographic profile and detailed medical history of the patients were taken through interviews as well as medical records. Written informed consent was obtained from the patients, explaining the nature of study thoroughly.

All patients in both groups were assessed for Pain using the Visual Analogue Scale (VAS) and strength using MMT(Manual Muscle Testing). The selected patients were randomly divided into two groups using chit method, Group A (n=15) and Group B (n=15). Group A was administered MET technique with hot pack whereas Group B received MFR technique with hot pack for a total of twelve weeks, with five sessions per week lasting for 30 minutes. All patients were again reassessed for above variables after twelve weeks of completion of intervention in both groups.

The Pain of the patients was assessed through Visual Analogue Scale (VAS) . It is one of the pain rating scales used for the first time in 1921 by Hayes and Patterson. It is often used in epidemiologic and clinical research to measure the intensity or frequency of various symptoms.[14] Patients strength was assessed using MMT. It may be referred to as motor testing, muscle strength grading, manual muscle testing, or any other synonyms. Muscle strength can be assessed by a number of methods-manually, functionally, or mechanically.Strength depends on the combination of morphological and neural factors including muscle cross-sectional area and architecture, musculotendinous stiffness, motor unit recruitment, rate coding, motor unit synchronization, and neuromuscular inhibition.[15]

MET technique is provided in Annexure [A] and MFR in Annexure [B]. Six patients voluntarily discontinued the interventional program of the study due to compliance-related problems and were considered

dropouts. Thus, a total of thirty patients completed the study.

Figure 1 MET Being Given To The Patient

RESULTS

The data was analysed using SPSS version 26. The patients were assessed for homogeneity of age, height, weight and BMI, as well as for baseline scores of VAS and MMT. The differences among all the variables were not significant.

Table 1: Comparison Of Mean Values For VAS And MMT Scores Pre- And Post-intervention In Groups A and B

Parameters	GROUP A		t value	p value	GROUP B		t value	p value
	Pre Mean ± SD	Post Mean ± SD			Pre Mean ± SD	Post Mean ± SD		
VAS	7.46 ± .91	2.53 ± .91	14.31	.0001 (S)	7.6 ± 1.24	4.53 ± 1.59	6. 782	.0001 (S)
MMT	2.53 ± .51	4.73 ± .45	-12.6	.0001 (S)	2.66 ± .48	4.06 ± .79	-10. 69	.0001 (S)

Table 1 compares the mean values of VAS and MMT scores before and after the intervention within the two groups. The analysis of VAS and MMT scores using Student's t-test indicated significant difference ($p<0.05$) in pre- and post-intervention in both groups.

Table 2: Comparison Of The Improvement In Mean Values For VAS And MMT Scores Of Pre- And Post-interventions In Groups A and B

Parameters	GROUP A (Mean ± SD)	GROUP B (Mean ± SD)	t value	p value
VAS	4.93±1.33	3.06±1.75	3.28	.003 (S)
MMT	2.2±.676	1.4±.507	3.66	.001(S)

The analysis of the difference in mean values of pre- and post-intervention of VAS and MMT scores between Groups A and B is described in Table 2. A comparison of VAS and MMT scores revealed a statistically significant difference ($p<0.05$) between Groups A and B.

DISCUSSION

The present study was performed in a Indian population of patients with patellar tendinopathy. A total of thirty six patients with hydrocephalus were initially included in the study. However, six patients could not complete the intervention due to compliance-related issues. Thus, thirty patients successfully completed the interventional program.

This study aimed to compare the effectiveness of Muscle Energy Technique (MET) and Myofascial Release (MFR), both combined with heat therapy, conventional exercises, and passive stretching, in improving pain and muscle strength in individuals with patellar tendinopathy.

The findings indicate that both MET and MFR led to significant improvements in Visual Analogue Scale (VAS) pain scores and Manual Muscle Testing (MMT) strength scores. However, MET showed greater effectiveness in reducing pain and enhancing muscle function compared to MFR. The statistical analysis revealed a significant difference between the two groups, with MET demonstrating superior outcomes in terms of pain reduction and strength gains.

MET played a crucial role in pain reduction and functional recovery through several neuromuscular mechanisms. The technique utilized reciprocal inhibition, where the contraction of the quadriceps led to the relaxation of the opposing hamstrings, facilitating increased ROM. Additionally, post-isometric relaxation following isometric contraction allowed the quadriceps to achieve a more relaxed state, further enhancing ROM and muscle balance.

Activation of the Golgi Tendon Organ (GTO) during MET contributed to reflex inhibition of the muscle, allowing greater relaxation and reducing muscle tension. The modulation of the stretch reflex helped in reducing muscle hypertonicity, which otherwise restricts joint movement. Furthermore, MET improved neuromuscular coordination, balance, and proprioception by actively engaging muscles, contributing to better functional outcomes.

MFR was effective in addressing fascial restrictions, muscle tightness, and pain. The technique improved mobility by releasing myofascial trigger points, which are hyperirritable spots within the fascia and muscle. The application of sustained pressure helped in reducing muscle spasms and enhancing blood circulation, thereby promoting tissue healing and reducing pain.

MFR also influenced the nervous system by decreasing motor neuron excitability, leading to decreased muscle tension and improved function around the knee joint. Additionally, it facilitated lymphatic drainage, reducing swelling and inflammation, which contributed to improved ROM. The pain relief mechanism of MFR was supported by the gate control theory, where activation of larger sensory fibers modulated pain perception.

While both MET and MFR demonstrated effectiveness in reducing pain and improving ROM, MET had a greater impact on muscle strength and neuromuscular control. The active engagement of muscles in MET helped in re-educating neuromuscular pathways, leading to better motor control and balance. In contrast, MFR primarily targeted passive fascial and muscular restrictions without actively engaging the neuromuscular system to the same extent.

Several studies support the efficacy of MET in improving muscle function and ROM. The systematic review by Thomas et al. (2019) concluded that Muscle Energy Techniques (MET) are effective in reducing both chronic and acute lower back pain, as well as chronic neck pain and chronic lateral epicondylitis.[16] Additionally, MET can increase joint range of motion when functional limitations are present. The study by Komalasari and Handayani (2024) concluded that the Muscle Energy Technique (MET) significantly reduces pain and increases the range of motion in patients with knee osteoarthritis.[17]

The results of this study suggest that incorporating MET into rehabilitation programs for patellar tendinopathy can yield superior functional outcomes compared to MFR. Given its ability to actively engage muscles, improve proprioception, and enhance muscle strength, MET should be considered a primary intervention for patients experiencing functional limitations due to patellar tendinopathy.

Future research should explore the long-term effects of MET in larger, homogenous populations, as patellar tendinopathy has a higher incidence in females. Additionally, studies incorporating electromyographic (EMG) analysis could provide further insights into neuromuscular activation patterns associated with MET and MFR interventions.

Both MET and MFR proved to be effective treatment approaches for patellar tendinopathy, but MET demonstrated greater improvements in pain relief and muscle strength. The active engagement of muscles, neuromuscular re-education, and enhanced proprioception with MET likely contributed to its superior outcomes. Based on these findings, MET should be considered a preferred technique in the rehabilitation of patients with patellar tendinopathy to optimize functional recovery and pain management.

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Annexure A: Muscle Energy Technique (MET) for Quadriceps
Patient Position:
- Side-lying Position.

Procedure:
1. The physiotherapist positions the patient in side-lying and controls the affected knee.
2. The therapist asks the patient to relax fully before gently lowering the knee towards the treatment couch.
3. The knee dropping down indicates a normal length of the fascia lata (ITB).
4. If the knee remains in position without dropping, this indicates tightness in the Tensor Fascia Lata (TFL) or Iliotibial Band (ITB).
5. The hip is allowed to fall into hip flexion and internal rotation.
6. The exercise is repeated for 10 repetitions, with each repetition held for 5 seconds.
7. Isometric Contraction: The therapist instructs the patient to gently contract the quadriceps muscles against resistance. This contraction should be held for 5 seconds at a sub-maximal effort level to avoid fatigue.

Post-Treatment: After completing the Muscle Energy Technique (MET), apply a hydrocollator pack or a hot pack superficially over the quadriceps muscle group.The pack should be applied for 10-15 minutes to provide relief and enhance relaxation of the treated muscles.

Repetitions
- 10 repetitions per session with 5-second hold time for each contraction.

Annexure B: Myofascial Release for Quadriceps with Hot Pack
Patient Position:
- Supine lying position.

Procedure
1. The physiotherapist prepares for the procedure by applying paraffin oil over the exposed surface of the quadriceps muscle.
2. The therapist uses a group of stroking manipulations including:
o Superficial Stroking
o Deep Stroking (Effleurage)
o Palmer Kneading (using the palmer aspects of hands, fingers, knuckles, and thumbs).
3. The therapist locates specific trigger points by identifying areas of the muscle that feel tender, tight, or knotted. These trigger points often feel like small nodules or bands within the muscle.
4. The therapist applies direct pressure to the trigger point, starting with gentle pressure and gradually increasing as tolerated. The pressure should be firm but not painful beyond the patient's tolerance level.
5. Variations of using one hand or both hands may be employed to cover the medial and lateral aspects of the thigh.
6. The therapist uses single to multiple strokes, typically performing 30-50 strokes on both the medial and lateral aspects of the thigh.
7. Duration: 3-5 sets with 15-second hold for each stroke.

Post-Treatment
After completing the myofascial release technique, a hot pack is applied to the quadriceps muscle for 10-15 minutes to enhance muscle relaxation and blood flow.

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