Original Article

COMPARISON OF ACTIVE RELEASE TECHNIQUE AND MYOFASCIAL RELEASE TECHNIQUE ON PAIN, GRIP STRENGTH & FUNCTIONAL PERFORMANCE IN PATIENTS WITH CHRONIC LATERAL EPICONDYLITIS

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ABSTRACT

Background & Purpose: Lateral epicondylitis is the most common lesion of the elbow. Tennis elbow or lateral epicondylitis is defined as a syndrome of pain in the wrist extensor muscles at or near their lateral epicondyle origin or pain directly over the lateral epicondyle. So, the aim of this study was to compare the effectiveness of Active Release Technique (ART) and Myofascial Release Technique (MFR) in the treatment of Chronic Lateral Epicondylitis (CLE).

Methodology: The study included thirty-six patients with Chronic Lateral Epicondylitis of age group range between 30 to 45 years. Patients were randomly divided into three groups: Control Group (A), Active Release Technique Group (B) and Myofascial Release Technique Group (C). The patients were treated for 4 weeks and three outcome measures: 0-10 NPRS, Hand Dynamometer and PRTEE were taken for assessment and analysis at baseline and after 4th weeks was done.

Result: In this study the result showed that Active Release Technique and Myofascial Release Technique were effective in all three outcome measures when compared to Control Group. Myofascial Release Technique was more effective in improving grip strength & reducing pain & disability when compared to Active Release Technique.($p<0.05$)

Conclusion: Active Release Technique and Myofascial Release Technique are effective in patients with Chronic Lateral Epicondylitis. Myofascial Release Technique demonstrated better outcomes than Active Release Technique in the management of Chronic Lateral Epicondylitis.

KEYWORDS: Chronic Lateral Epicondylitis, ART, MFR, NPRS, PRTEE, Grip Strength, Hand Dynamometer.

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INTRODUCTION

Lateral epicondylitis is the most common lesion which occurs at elbow.[1] Pain in the wrist extensor muscles at or near their lateral epicondyle origin or pain directly over the lateral epicondyle is termed as Lateral Epicondylitis.[2] Lateral epicondylitis or tennis elbow is an overuse injury that is characterized by pain and tenderness over the lateral epicondyle.[3] The term tennis elbow is a misnamed because it also occurs in non-tennis players also. It was first described in 1873, still distinct pathoetiology and treatment are uncertain.[4]

Lateral epicondylitis is a chronic overuse injury

causing damage to the extensor muscles tendons of the forearm.[5] The tendon which is most commonly involved is the extensor carpi radialis brevis and occasionally the extensor digitorum, extensor carpi radialis longus and rarely, the extensor carpi ulnaris.[6] The ICD -10 of Lateral Epicondylitis is M77.1.

Lateral Epicondylitis is most commonly an idiopathic or a work related condition.[7] The peak prevalence of it is in the fourth decade of life when it is four times more common than any other decade & the peak incidence of this condition occurs between the ages of 30 and 60.[8] It is most prevalent (35-64%) in jobs requiring repetitive manual tasks. It results in restricted function and it is one of the most costly of all work-related illness.[9]

The pathology of lateral epicondylitis involves a tear of the tendon at origin of the extensor muscles from lateral epicondyle. The tear occurs at the junction between muscle and bone and healing is slow because of lack of periosteal tissue overlying this bone area. The susceptibility of ECRB muscle is due to excessive strain which is probably related to the added tensile load imposed on the tendon by the radial head when the tendon is stretched. In this position the tendon is further stretched over the prominence of the radial head.[10]This is further compounded by the head of the radius which rotates anteriorly against extensor carpi radialis brevis during pronation of the forearm. Many individuals may experience pain at the head of the radius during pronation which is due to irritation of the underlying bursa.[11]

In tennis elbow, the main complaint is of pain and decreased function which may affect activities of daily living, the pain is often caused with flexion and extension of the wrist and due to pronation and supination activities.[11] Long-established treatment protocol for lateral epicondylitis consists of anti-inflammatory medication, ultrasound, iontophoresis or phonophoresis for pain relief followed by stretching and strengthening exercises for flexibility and endurance training. Most common treatments given for lateral epicondylitis is rest, ice, non-steroidal anti-inflammatory drugs, corticosteroid injections, range of motion exercises, stretching, strengthening exercises, counterforce bracing, iontophoresis, acupuncture and ergonomic adjustments or training.[9]

Nowadays soft tissue technique to gain importance is Active Release Technique-ART.[12, 13]Active Release Technique (ART)is developed and patented by P. Michael Leahy which is a soft tissue system/movement-based technique. Problems with muscles, tendons, ligaments, fascia and nerves are successfully treated with it. The main principle of this technique is that the forearm has cross tissues situated at oblique angles to one another which produce adhesions, fibrosis and local oedema due to reactive changes and thus causing pain and tenderness. Active Release Technique is application of deep digital tension over tenderness and asking the patient to actively move the tissue from the shortened to a lengthened position and thereby breaking the adhesion formed.[12, 13]

Myofascial Release Technique (MFR) is being used to treat patients with Lateral Epicondylitis, but there are few formal reports of its success rate. MFR is the application of a low load, long duration stretch to the myofascial complex, intended to restore optimal length, decrease pain and improve function[14]

Aim of the study was to compare the effect of Conventional Physiotherapy, Active Release Technique and Myofascial ReleaseTechnique on pain, grip strength & functional performance in patients with Chronic Lateral Epicondylitis.

MATERIALS AND METHODOLOGY

After institutional ethical approval, all the patients completed a detailed assessment. Prior to participation in this study total 60 patients diagnosed as Chronic Lateral Epicondylitis were referred from various orthopaedic & physician outpatient department, out of them 12 patients weren't fulfilling the inclusion criteria, 05 patients declined to participate and rest 07 patients were randomly excluded from the study using random number table method. So, total 36 patients were selected for the study. Prior to participation patients were instructed and explained about the treatment procedure. Pre participation evaluation form consisted of general demographic details of patient, duration of condition, detail evaluation of the elbow to rule out other pathology, NPRS

to assess pain intensity level, Hand Dynamometer to assess grip strength and PRTEE to assess functional ability. The selection and allocation of patients was done by using random number table sampling method.

The included patients were of age group 30-45 years both males and females[7-9], symptomatic chronic lateral epicondylitis as established by expert orthopedician and physician with unilateral involvement and positive 'Cozen's test' or 'Mill's test' reinforced the presence of lateral epicondylitis[5], Pain intensity level between 3 to 6 on 0-10 point numerical pain rating scale, and the patients willing to participate in the study.

They were excluded if having any history of trauma, surgery, acute infections, malignancy or any systemic disorders, acute lateral epicondylitis or having any cervical spine or any other upper limb dysfunction, neurological diseases, cardiovascular diseases, osteoporosis, recent steroid infiltration, athletes and Patients who recently underwent physiotherapy interventions (at least 3 months before).[12, 15]

INTERVENTIONS:

Patients were requested to continue normal activities and avoid other forms of treatment for the duration of the study. Patients other than the designated protocol were not permitted to administer any other forms of electrotherapy or other techniques (steroids,acupuncture or taping) during the intervention period of the trial.

Patients in Group A (Control) received **Conventional Physiotherapy** that included Pulsed Ultrasound Therapy and graduated exercise therapy regimen including stretching exercises and strengthening exercises.

Patients in Group B (ART) received **Active Release Technique,** Pulsed Ultrasound Therapy and graduated exercise therapy regimen including stretching exercises and strengthening exercises.

Patients in Group C (MFR) received **Myofascial Release Technique,** Pulsed Ultrasound Therapy and graduated exercise therapy regimen including stretching exercises and strengthening exercises.

CONVENTIONAL THERAPY[16-21] **(Group A)**

It included pulsed ultrasound therapy at tenoperiosteal junction of the extensor carpi radialis brevis with 1:4 Pulse Ratio of 1MHz at 1.5 W/cm^2 for 5 minutes. Total: 3 Session per Week, Total of 12 sessions. Stretching Exercises were given with patient seated and forearm pronated, elbow extended; the wrist being palmar- flexed using the other hand of patient or with the help of wall. This was held for 30 seconds and then released. Total: 10 stretches per session, Daily One session and Strengthening Exercises were given with patient in seating position and isometric contractions with the elbow flexed to 90°, with the hand of unaffected arm applying manual resistance over the dorsum of the supinated arm of affected side. Pain free isometric contraction of the wrist extensors was initiated and held for 5 to 10 seconds. Total: 15contractions per session, Daily One Session.

Active Release Technique (ART) [12, 22] **(Group B)**

ART was given with patient seated, elbow flexed and resting on the treatment table, forearm in midprone & wrist in neutral position and then the therapist worked on the extensor carpi radialis longus and brevis muscles by applying pressure to the muscles distal to their attachment at the elbow. The patient started with the elbow bent and wrist straight. As the therapist hold the muscles, the patient extended the elbow and pronated and flexed the wrist while the therapist moved the pressure proximally, attempting to release adhesions around and between muscle planes. Total of 15 repetitions for of 10 minutes, 3 times a week for 4 weeks.

Myofascial Release Technique (MFR) [14, 15] **(Group C)**

MFR was given with patient in supine lying, shoulder in internal rotation, elbow pronation and flexion to around 15°, palm resting flat on the table and therapist standing to the side of the table at the level of the patient's shoulder and facing the ipsilateral hand.

Procedure 1-Treating from the common extensor tendon to the extensor retinaculum of the wrist, the therapist began on the humerus, just proximal to the lateral epicondyle. The therapist used the fingertips to engage the periosteum

and carried this contact inferior to the common extensor tendon and then down to the extensor retinaculum of the wrist. Patients were trained to slowly flex and extend the elbow within an easy range of 5° to 10° during this procedure.(5min, 2 repetitions).

Procedure 2-Treating through the periosteum of the ulna, the therapist used the knuckles of the hand to work over the periosteum of the ulna. Patients were trained to do alternating ulnar and radial deviation of the wrist while periosteum of ulna being engaged. (5min, 2 repetitions).

Procedure 3-Spreading the radius from the ulna, the therapist contacted the head of the ulna with the finger pads of one hand and the dorsal tubercle of radius with the pads of the other. The therapist was engaged through to the periosteum and put a line of tension in a lateral and distal direction. This was carried for just a few centimeters with a firm intent to spread the bones apart (5min, 2 repetitions). Total 30 minutes session, 3 times a week for 4 weeks.

Fig. 1: ART-Starting Position.

Fig. 2: ART- End Position

Fig. 3: MFR-Procedure 1

Fig. 4: MFR-Procedure 2

Fig. 5: MFR-Procedure 3

OUTCOME MEASURES:

The primary outcome measures were NPRS[23], hand grip strength with Hydraulic Hand Dynamometer[24] and PRTEE[25] which were taken at Baseline and after 4 weeks of intervention.

STATISTICAL ANALYSIS:

All statistical analysis was done using SPSS 19.0 software for windows. Descriptive analysis was obtained by mean & standard deviation. Intergroup comparison of pre-treatment scores of Numeric Pain Rating Scale, Grip Strength & Patient Rated Tennis Elbow Evaluation was done using non parametric Kruskal Wallis Test. Intra group comparison of pre & post treatment scores of Numeric Pain Rating Scale, Grip Strength & Patient Rated Tennis Elbow Evaluation was done using parametric Paired t-test and nonparametric Wilcoxon Signed Rank Test. Intergroup comparison of post treatment scores of Numeric Pain Rating Scale, Grip Strength & Patient Rated Tennis Elbow Evaluation was done using non parametric Kruskal Wallis Test. One way ANOVA post hoc analysis was done to compare the difference in effectiveness within the groups. Confidence interval of 95% and p=0.05 been analysed.

RESULTS AND TABLES

The groups were homogenous in their demographic details with p>0.005(Table-1).The pre-treatment NPRS (p=0.978), Grip Strength (p=0.932) and PRTEE (p=0.998) shows that there is no significant difference (p>0.01) and proves the pre-treatment group homogeneity (Table-3). Pre and post treatment comparison for NPRS(Group A: p=0.002, Group B: p=0.002, Group C:p=0.002), Grip Strength (Group A: p=0.000, Group B: p=0.003, Group C: p= 0.000) and PRTEE (Group A: p=0.002, Group B: p=0.002, Group C: p= 0.002) shows highly significant difference (p<0.001) within the groups (Table-4)).It indicates that both ART and MFR were helpful in reducing pain and improving grip strength and

functional performance in chronic lateral epicondylitis patients. The post treatment inter group comparison of NPRS (p=0.002), Grip Strength (p=0.002) and PRTEE (p=0.000) shows highly significant difference (p<0.001) in the improvement between three groups (Table-5). MFR proves more significant improvement in NPRS, Grip Strength and PRTEE. Multiple comparisons were done by Post hoc analysis test to justify the intergroup difference for each outcome measures. The results of post hoc analysis for NPRS suggested that after 4 weeks of intervention, MFR group produced greater improvement in all three outcome measures (NPRS, Grip Strength and PRTEE) than ART Group and Control Group. Post hoc for NPRS Score, suggested that ART Group (p = 0.019) and MFR Group (p = 0.001) groups improved better than Control Group and significant difference (p = 0.583) between ART Group and MFR Group. When Post hoc was done for Grip Strength Score, it suggested that ART Group (p = 0.071) and MFR Group (p = 0.001) improved better than Control Group and a significant difference (p = 0.281) between ART Group and MFR Group. Post hoc for PRTEE Score suggested that ART Group (p = 0.001) and MFR Group (p = 0.000) improved better than Control Group and a significant difference (p = 0.004) between ART Group and MFR Group. This means that MFR is more effective in reducing pain & disability and improving grip strength.

SAMPLING TECHNIQUE:

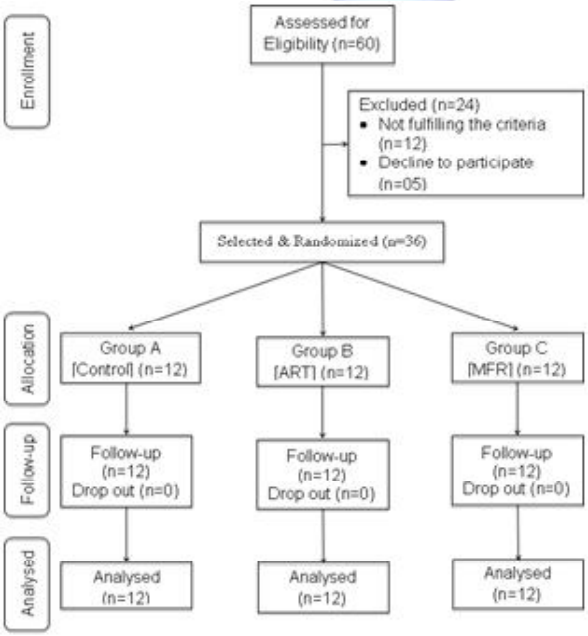

Table 1: Age distribution of Group A (Control group), Group B (ART group) and Group C (MFR group).

Group	N	Mean Age	SD	SE	Minimum	Maximum	P Value
Control (A)	12	37.92	4.2	1.22	32	45	0.000
ART (B)	12	38.17	4.23	1.22	31	45	
MFR (C)	12	38.75	4.18	1.21	32	44	
Total	36	38.28	4.1	0.68	31	45	

Table 2: Pre-treatment group comparison.

Outcomes	Group A (Control)			Group B (ART)			Group C (MFR)			P Value
	Mean	SD	SE	Mean	SD	SE	Mean	SD	SE	
NPRS	4.17	1.15	0.321	4.16	1.11	0.322	4.25	1.13	0.329	0.978
Grip Strength (lb.)	23.67	3.8	1.096	23.83	4.04	1.167	24.5	5.27	1.52	0.932
PRTEE	61	5.08	1.467	61.16	3.85	1.114	61.23	4.55	1.313	0.998

Table 3: Intra Group NPRS, Grip Strength and PRTEE Comparison.

Intra-Group NPRS, Grip Strength and PRTEE Comparison													
		Group A				Group B				Group C			
		Mean	SD	SE	P Value	Mean	SD	SE	P Value	Mean	SD	SE	P value
NPRS	Pre	4.17	1.11	0.32	0.002	4.16	1.11	0.32	0.002	4.25	1.13	0.3	0.002
	Post	2	0.74	0.21		1.08	0.79	0.23		0.67	0.77	0.2	
Grip Strength	Pre	23.7	3.8	1.1	0.000	23.8	4.04	1.17	0.003	24.5	5.26	1.5	0.000
	Post	38.5	6.21	1.79		46.2	9.68	2.8		51.8	7.48	2.2	
PRTEE	Pre	61	5.08	1.47	0.002	61.2	3.85	1.11	0.002	61.2	4.54	1.3	0.002
	Post	30.8	4.54	1.31		23.8	4.04	1.17		19.7	4.24	1.2	

Table 4: Post-treatment group comparison.

Outcomes	Group A (Control)			Group B (ART)			Group C (MFR)			P Value
	Mean	SD	SE	Mean	SD	SE	Mean	SD	SE	
NPRS	2	0.73	0.213	1.08	0.79	0.229	0.67	0.77	0.225	0.002
Grip Strength (lb.)	38.5	6.21	1.794	46.17	9.68	2.796	51.75	7.48	2.161	0.002
PRTEE	30.83	4.54	1.313	23.83	4.04	1.166	19.67	4.24	1.226	0.000

Table 5: Multiple Comparison for mean of difference of NPRS between Group A (Control), Group B (ART) and Group C (MFR).

Dependent variable	GROUPS		SE	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Post NPRS	Control	ART	0.31449	0.019	0.1234	1.7099
		MFR		0.001	0.5401	2.1266
	ART	Control		0.019	-1.7099	-0.1234
		MFR		0.583	-0.3766	1.2099
	MFR	Control		0.001	-2.1266	-0.5401
		ART		0.583	-1.2099	0.3766

Table 6: Multiple Comparison for mean of difference of Grip Strength between Group A (Control), Group B (ART) and Group C (MFR).

Dependent variable	GROUPS		SE	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Post Grip Strength	Control	ART	3.23563	0.071	-15.8276	0.4943
		MFR		0.001	-21.4109	-5.0891
	ART	Control		0.071	-0.4943	15.8276
		MFR		0.281	-13.7443	2.5776
	MFR	Control		0.001	5.0891	21.4109
		ART		0.281	-2.5776	13.7443

Table 7: Multiple Comparison for mean of difference of PRTEE between Group A (Control), Group B (ART) and Group C (MFR).

Dependent variable	GROUPS		SE	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Post PRTEE	Control	ART	1.74946	0.001	2.5875	11.4125
		MFR		0	6.7542	15.5792
	ART	Control		0.001	-11.4125	-2.5875
		MFR		0.004	-0.2458	8.5792
	MFR	Control		0	-15.5792	-6.7542
		ART		0.004	-8.5792	0.2458

DISCUSSION

Results indicate that there is significant improvement in pain, grip strength and functional performance in patients with Chronic Lateral Epicondylitis at the end of 4 weeks in all the three groups after Conventional Physiotherapy alone Group A, ART with Conventional Physiotherapy Group B & MFR with Conventional Physiotherapy Group C. All the three treatment groups obtained successful outcomes as measured by significant improvement in NPRS score, Grip Strength and PRTEE score after 12 sessions of intervention. There is significant difference in intensity of pain as per NPRS, Grip Strength as per Hand Dynamometer and functional performance as per PRTEE between three groups.

Lateral Epicondylitis is one of the conditions which can be treated by a wide variety of physiotherapy methods. It is still difficult to formulate all proof guidelines for the management of lateral epicondylitis. Various methods of treatment exist with own claims of success without any attempts of comparing the maximal effective methods. The objective of this study was to compare the effectiveness of Active Release Technique and Myofascial Release Technique in the treatment of Chronic Lateral Epicondylitis.

In our study, we found that Active Release Technique and Myofascial Release Technique both were effective in reducing pain and disability and in improving Grip Strength in patients with Chronic Lateral Epicondylitis. But MFR was more effective than ART in reducing pain and disability and in improving Grip Strength in patients with Chronic Lateral Epicondylitis.

The present study had demonstrated that both, ART and MFR are effective in relieving pain and improving Grip Strength and Functional performance but MFR was found to be more effective in patients with Chronic Lateral Epicondylitis, this effect is similar to previous research report.[12, 14, 23, 26, 27]So, these interventions can be applied in clinical setup in combination with conventional treatment for the better and long term improvements.

CONCLUSION

Our study leads to following conclusions that after 12 sessions of treatment both active release technique and myofascial release technique were effective in the treatment of chronic lateral epicondylitis but myofascial release technique was found superior than active release technique.

LIMITATIONS OF THE STUDY:

1. The study consists of a small quantity of patients.
2. No long term follow up was done.
3. No blinding was done.

SCOPE FOR FURTHER STUDY:

1. Further study can be done with larger sample size.
2. Study can be done with long term follow up.
3. The same study can be done on acute lateral epicondylitis patients.
4. The study can be done to know the additive effect of Laser, Deep transverse friction massage along with Active Release Technique or Myofascial Release Technique.
5. The same study can be done to investigate eccentric exercises training along with Active Release Technique or Myofascial Release Technique.

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Conflicts of interest: None

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