

Effectiveness Of MFR & Cyriax on Pain , Grip Strength and Functional Status in patients with Lateral Epicondylitis -A randomized controlled trial

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ABSTRACT

BACKGROUND: *Lateral Epicondylitis is one of the common conditions in the elbow joint. Muscles and soft tissue around the elbow are predominantly involved in Lateral Epicondylitis. Studies identified that extensor muscles specifically Extensor Carpi Radialis Brevis (ECRB) is affected due to vigorous and repeated wrist movements. Multiple management strategies have been identified ranging from conservative to surgical, Cryotherapy to ergonomic advices, but still the results are inconclusive.*

AIMS: *The purpose is to compare the effect of Cyriax technique with myofascial release technique in the reduction of pain and improvement of grip strength and functional ability for subjects with Lateral Epicondylitis.*

METHOD: *A pre- post experimental study design with 60 sample size was selected for the study in consideration of the inclusion and exclusion criteria. Study was approved by the institutional ethical committee. Outcome measures were pain using Numerical Rating Scale (NRS) , grip strength by Hand Held Dynamometer (HHD) and functional ability by Tennis Elbow Functional Scale (TEFS) . Patients were randomly divided into three groups: Control Group (A), Cyriax group (B) and Myofascial Release Technique Group (C). The patients were treated for 4 weeks.*

RESULT: *In this study the result showed that Cyriax technique and Myofascial Release Technique were effective in all three outcome measures when compared to Control Group. There is no statistically significant difference in pre-intervention means of NRS ,HHD and TEFS when compared between the groups. When means of post intervention measurements were compared there is a statistically significant ($p<0.05$) difference in NRS , grip strength and TEFS scores between the groups. However greater percentage of improvements was obtained in study group than control group. Myofascial Release technique was more effective in reducing pain and improving grip strength & functions when compared to Cyriax technique.($p<0.05$)*

CONCLUSION: *It is concluded that there is significant difference with greater percentage of improvement in pain , grip strength and functional ability up to 4 weeks for MFR group and Cyriax groups . MFR group shows more significant difference in all the three outcome measures .*

Keywords: Cyriax , MFR technique , Deep Friction massage , Tennis Elbow, Pain , NRS ,grip strength.

INTRODUCTION:

Lateral epicondylitis (LE) is the second most frequently diagnosed musculoskeletal upper extremity disorder in a primary care setting¹. The most commonly affected structure is the Extensor Carpi Radialis Brevis (ECRB) tendon that is characterized by the increased presence of fibroblasts, vascular hyperplasia and disorganized collagen and the average duration of a typical episode of LE is 6 months – 2 years². Lateral epicondylitis occurs 7 to 20 times more frequently than medial epicondylitis³. The dominant arm is commonly affected with the prevalence of 1-3% in general population, but this increase to 19% at 30-60 years of age⁴.

It is a prevalent musculoskeletal disorder that is characterized by lateral elbow pain often associated with gripping tasks, it affects at the age group of 30—60 years. It is a soft tissue lesion affecting equally both genders .Various intrinsic factors are the cause for the chronic lateral epicondylitis which are discussed in numerous literatures^{4,5}. The studies discussed that extensor carpi radialis brevis is affected due to repeated wrist motions. Tear of the tendon at the junction between the muscle and bone leads to poor healing of the tissues ,this is due to lack of overlying periosteal tissues⁵.

Repetitive movement creates micro trauma which may occur due to overuse or abnormal joint biomechanics, leading to overload of the repairing tissues, this mechanically distort scar tissue and thus stimulate free nerve endings to ¹⁰ evoke mechanical nociceptive pain ⁴. There will be a fibroblastic proliferation of the tendon which will result in degenerative process or failed reparative process resulting in more than acute inflammation. Symptoms of lateral epicondylitis occurs following any activity like gripping, lifting on the painful side, door knob turning, lifting bags, and shaking hands that produce pain over

the lateral epicondyle. These symptoms are exacerbated by activities involving repeated wrist extension while gripping a thin object^{4,5}. (eg: picking up a cup).

Many clinicians advocated various conservative therapies as the treatment of choice for the lateral epicondylitis . Physiotherapy is the best conservative treatment which was usually recommended ^{6,7}. There are number of treatment approaches used in the management of lateral epicondylitis, which includes modalities like Cryotherapy, LASER, electrical stimulations, Ultrasound, therapeutic exercises like stretching and strengthening, external appliances like splinting,¹⁶ elbow bands and patient education. However there is no general consensus that exists about the most appropriate management strategy for lateral epicondylitis. Bisset et al.,2005, identified the evidences for the elbow manual therapy and the therapeutic exercises^{8,9}.

Manipulation of wrist is capable of relieving symptoms in lateral epicondylitis patients ^{10,11}. Cyriax and Cyriax (1983)¹⁹ suggested the use of deep transverse friction massage in combination with Mill's manipulation for the treatment of LE. For it to be considered a Cyriax intervention, the two components must be used together in the order mentioned. In order to label the treatment intervention as Cyriax physiotherapy, both the treatment components mentioned above must be used jointly in the sequence specified. In this protocol, person must adhere to this intervention 3 times a week for duration of 4 weeks ¹². However, the number of research studies analysing the effectiveness of this treatment intervention is less, the reason being that most of them do not have proper randomization, blinded outcome measures , and accurate functional outcome questionnaires¹²⁻¹⁴. For the above-mentioned reasons, further research is warranted to find out the effectiveness of Cyriax physiotherapy intervention.

Myofascial release therapy (MFR) is one of the common techniques which is used by physical therapist in managing the symptoms in lateral epicondylitis, however the success rate of the ²⁴therapy is not well addressed.. MFR is applied with low load, long duration stretch on the fascial complex, which intended to restore optimal length, ²⁵decrease pain and improve function . Ajimsh et al. applied MFR for patients who were computer professionals with lateral epicondylitis and reported that the MFR group performed better than the control group¹⁶⁻¹⁹. Though there are various treatment methods that show its beneficial effects in the management of lateral epicondylitis, there are a few studies conducted to investigate the effect of MFR and its role on grip strength. This study is focused to find out the effect of myofascial release therapy on pain and grip in lateral epicondylitis¹⁵⁻¹⁷.

Very less study has been done on comparing Cyriax technique and MFR for Lateral Epicondylitis..So this study will highlight the comparative effect of Cyriax technique and Myofascial Release Technique on pain, grip strength & functional performance in patients with Lateral Epicondylitis.

METHODOLOGY :

STUDY DESIGN:

This study was parallel group randomized control trial, with random allocation of the subjects by envelope method to either of the three groups (control group ,myofascial group and cyriax group) using purposive sampling method. Total number of Sample size was calculated to be 62 participants (power = 80 and level of significance $p < 0.05$) . A randomized controlled trial was conducted between January and April 2017 in an outpatient department, Physiotherapy and Rehabilitation centre, Surat ,India. Patients were referred by orthopaedic consultant, health care providers, and also self-referral to the centre.

All patients signed the written consent form prior to participation .The subjects were screened based on the inclusion and exclusion criteria. The study was carried for 4 weeks .Introduction about the study was given to all the participants . But the participants were blinded about the type of intervention they were being given.Also two of the physical therapists were blinded for the evaluation of outcome measures. The outcome selected in this study was pain , grip strength and TEFS . Pain was evaluated using NPRS , it is having high reliability when compared with other scales for pain assessment, moreover vas is easily, convenient and ready to use at any setting. Grip strength was measured using Hand held dynamometer; it is a light weight, hand held and more easy in use and gives more appropriate result and TEFS is Tennis Elbow Functional Evaluation Scale for functional status of elbow.

INCLUSION CRITERIA :

(1).Between 30 to 45 years of age .(2). The duration of symptoms was between 8 and 10 weeks.(3). Pain with gripping. (4) .Those who have Cozen test positive 5).Those who have Mill's test positive. (6).Tenderness on palpation over the lateral epicondyle of humerus.(7) No Physiotherapy taken before .

EXCLUSION CRITERIA :

(1) Cardiovascular diseases. (2) Neurological impairments. (3) Aversion to manual contact. (4) Neuromuscular diseases. (5) Previous trauma to the elbow region. (6) Previous surgery to the elbow region. (7) Peripheral nerve entrapment. (8) Cervical radiculopathy. (9) Corticosteroid injection within 6 months. (10) Previous therapy for elbow joint (minimizing expectation bias).

INTERVENTION**Group - A (control group)**

Participants received Conventional Physiotherapy that included Pulsed Ultrasound Therapy and graduated exercise therapy regimen including stretching exercises and strengthening exercises. 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/cm² for 5 minutes . 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, 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, Total: 3 Session per Week, continued for 4 weeks.

Group B: (MFR Group)

Along with conventional therapy, all subjects of group B had undergone for myofascial release manually by using thumb and plantar cupping by using heel of hand and fingers technique for 10 min in supine lying for single session . Myofascial Release Technique (MFR) . 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.Total 20 minutes session, 3 times a week for 4 weeks.

Group C :(cyriax group)

Along with conventional therapy , all subjects of group C had undergone for the Cyriax Physiotherapy . Cyriax physiotherapy consisted of 10 minutes of deep transverse friction massage (DTF) followed by a single application of Mill's manipulation. For DTF, the patient was positioned comfortably with the elbow fully supinated and in 90 degree of flexion. The anterolateral aspect of the lateral epicondyle was located and the area of tenderness was identified. DTF was applied with the side of the thumb tip applying the pressure in a posterior direction on the teno-osseous junction. This pressure was maintained while imparting DTF in a direction towards the therapist's fingers, which were positioned on the other side of the elbow for counter pressure. DTF was applied for 10 minutes. After the numbing effect was achieved, the tendon was prepared for Mill's manipulation (*Cyriax & Cyriax, 1983*). For Mill's manipulation; patients were positioned comfortably in the seating position with the affected extremity in 90° of abduction with the medial rotation enough so that the olecranon faced up. The therapist stabilized the patient's wrist in full flexion and pronation with one hand, while other hand was placed over the olecranon. While assuming full wrist flexion and pronation position, the therapist applied high – velocity low – amplitude thrust at the end range of elbow extension.

STATISTICAL ANALYSIS

Analysis was done using SPSS-16. Descriptive analysis was used to calculate mean and standard deviation . Paired t test was used for inter group analysis. ANOVA test was used for intra group analysis for all the three dependent variables. The level of significance was set at 95%.

RESULTS:

Pre and post intervention within group was done using paired t test which shows highly significant difference in all groups in all the outcome scores. Comparison between groups was done using ANOVA test which shows significant differences in all three groups for all variables .

Statistical Analysis within groups :**Table 1 : Group A Pre and post comparison of all 3 variables:**

	Paired Differences					T	Sig. (2-tailed)		
	Mean	SD	SEM	95% Confidence Interval of the Difference					
				Lower	Upper				
1. NPRSPRE- NPRSPOST	1.850	.988	.221	1.388	2.312	8.373	.000		
2. HGSPRE – HGSPOST	-3.800	2.668	.596	-5.048	-2.552	-6.371	.000		
3. TEFSPRE- TEFSPOST	2.850	3.617	.809	1.157	4.543	3.524	.002		

Table 2 : Group B Pre and post comparison of all 3 variables:

	Paired Differences						T	Sig. (2tailed)		
	Mean	S.D	SEM	95% Confidence Interval of the Difference						
				Lower	Upper					
1. NPRSPRE – NPRSPOST	3.300	1.593	.356	2.555	4.045		9.266	.000		
2. HGSPRE – HGSPOST	-13.400	3.844	.860	-15.199	-11.601		-15.588	.000		
3. TEFSPRE – TEFSPOST	7.450	2.460	.550	6.299	8.601		13.545	.000		

Table 3 : Group C Pre and post comparison of all 3 variables:

	Paired Differences						T	Sig. (2-tailed)		
	Mean	S.D	SEM	95% Confidence Interval of the Difference						
				Lower	Upper					
NPRSPRE- NPRSPOST	2.450	1.356	.303	1.815	3.085		8.079	.000		
HGSPRE- HGSPOST	-13.200	4.124	.922	-15.130	-11.270		-14.313	.000		
TEFSPRE- TEFSPOST	7.750	2.074	.464	6.779	8.721		16.709	.000		

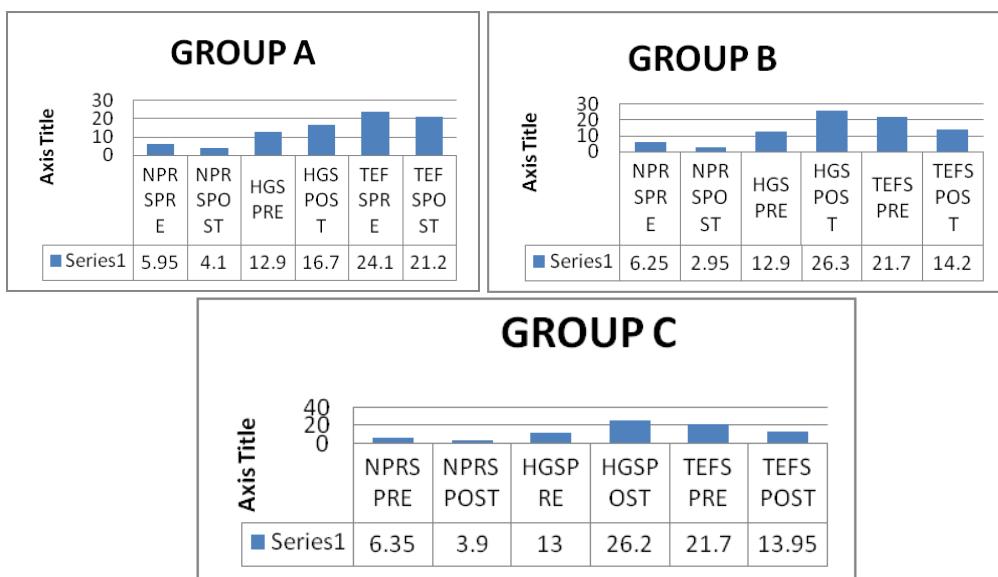


Table 4. illustrates descriptive statistics of NPRS in all the three groups

GROUPS	N	Mean	S. D	S.E.M	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	20	-1.8500	.98809	.22094	-2.3124	-1.3876	-4.00	.00
2	20	-3.3000	1.59275	.35615	-4.0454	-2.5546	-6.00	.00

3	20	-2.4500	1.35627	.30327	-3.0848	-1.8152	-5.00	.00
Total	60	-2.5333	1.44347	.18635	-2.9062	-2.1604	-6.00	.00

Table 5. illustrates descriptive statistics in TEFS in all the groups

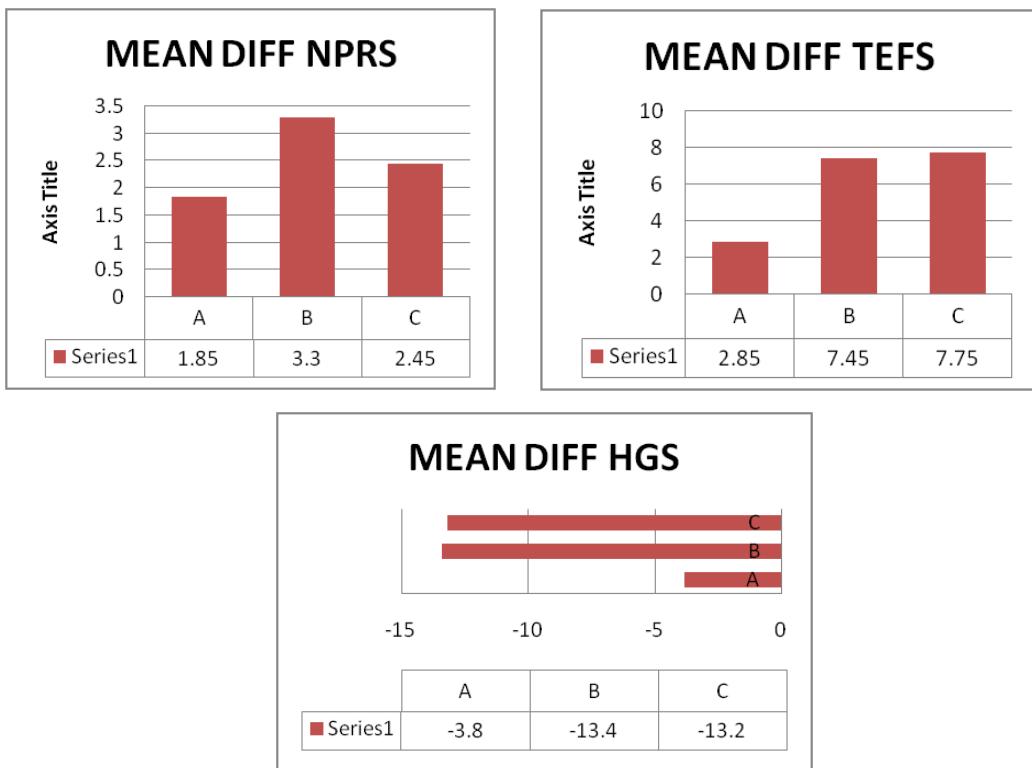
GROUPS	N	Mean	S.D	S.E.M	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
A	20	3.3500	3.13344	.70066	1.8835	4.8165	.00	14.00
B	20	7.3500	2.34577	.52453	6.2521	8.4479	3.00	11.00
C	20	7.7500	2.07428	.46382	6.7792	8.7208	5.00	11.00
Total	60	6.1500	3.21451	.41499	5.3196	6.9804	.00	14.00

Table 6. illustrates descriptive statistics in HGS in all the groups

GROUPS	N	Mean	S.D	S.E.M	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
A	20	3.7000	2.45164	.54820	2.5526	4.8474	.00	8.00
B	20	13.5000	3.66348	.81918	11.7854	15.2146	6.00	18.00
C	20	-13.2000	4.12438	.92224	-15.1303	-11.2697	-20.00	-6.00
Total	60	1.3333	11.63668	1.50229	-1.6727	4.3394	-20.00	18.00

Table7. illustrates between group comparision of NPRS,HGS And TEFS

	MEAN DIFF. GROUP A	MEAN DIFF. GROUP B	MEAN DIFF. GROUP C	F VALUE	P VALUE
NPRS	1.85	3.3	2.45	5.950	.004
HGS	2.85	7.45	7.75	300.350	.000
TEFS	-3.8	-13.4	-13.2	18.101	.000



Graph. 5,6,7, illustrates Mean Diff. scores of NPRS,HGS and TEFS in all three groups

DISCUSSION :

Results indicate that there is significant improvement in pain, grip strength and functional performance in patients with Lateral Epicondylitis at the end of 4 weeks in all the three groups after Control group A, MFR with Conventional Physiotherapy, Group B and Cyriax with Conventional Physiotherapy, Group C . All the three treatment groups obtained successful outcomes as measured by significant improvement in NPRS score, Grip Strength and TEFS 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 TEFS between three groups.

It is hypothesized that tennis elbow is best managed with Mill's manipulation²¹.The proposed mechanism of Mill's manipulation is the lengthening of scar tissue following the rupture of adhesions due to the manipulation. This increased length decreases tension on the scar leading to less pain, effectively converting a tear shaped like a "V" into one resembling a "U"²². The resulting gap is filled with fibrous tissue, resulting in permanent lengthening and abolition of pain^{21,23}. The application of friction massage is said to provide the patient with analgesia prior to the manipulation as well as softening the scar²³.It has been hypothesized that the mechanism of pain relief secondary to friction massage may be due to modulation of nociceptive impulses at the spinal cord level, also known as the gait control theory.²⁰

It is possible that treatment with MFR after LE may result in a halt in the degenerative process of the tendons at the lateral epicondyle by facilitating the healing process and the tendon architecture to return toward normality. It is also possible that pain relief due to MFR is secondary to returning the fascial tissue to its normative length by collagen reorganization; this is a hypothesis that merits investigation. As with any massotherapy techniques, the analgesics effect of MFR can also be attributable to the stimulation of afferent pathways and the excitation of afferent A delta fibers, which can cause segmental pain modulation²² as well as modulation through the activation of descending pain inhibiting systems.²

In our study, we found that Cyriax Technique and Myofascial Release Technique both were effective in reducing pain and in improving Grip Strength in patients with Lateral Epicondylitis. But MFR was more effective than Cyriax in reducing pain and in improving Grip Strength in patients with Lateral Epicondylitis. So, these interventions can be applied in clinical setup in combination with conventional treatment for the better and long term improvements.

CONCLUSION:

Hence it can be concluded that after 24 sessions of treatment ,both Cyriax technique and myofascial release technique were effective in the treatment of lateral epicondylitis but MFR technique was found superior than Cyriax technique on reducing pain and improving grip strength and functions in patients with lateral epicondylitis.

LIMITATIONS OF THE STUDY:

The study consists of a small sample size.No long term follow up was done. Only pain, grip strength and functional ability were studied, measurements such as range of motion and quality of life were not studied. The effects on occupation related tennis elbow was not studied.

SCOPE FOR FURTHER STUDY:

Further study can be done with larger sample size. Study can be done with long term follow up. Further study may be conducted using outcome measures like ROM and quality of life. Study could also be conducted to see the effects of intervention in different occupation like computer professionals having tennis elbow.

Conflict of interest-None

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