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Original Research Article

Myofascial Release Technique in Chronic Lateral Epicondylitis: A Randomized Controlled Study

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ABSTRACT

Background & Objective: Lateral epicondylitis (LE) is a chronic overuse injury commonly affecting the common tendinous origin of the wrist extensors. The objective of the study was to find the effectiveness of Myofascial Release Technique (MFR) on pain, functional performance and grip strength in Chronic Lateral Epicondylitis (CLE) subjects.
Study design: A randomized controlled study
Setting: Institutional based musculoskeletal Physiotherapy outpatient department.
Outcome measures: Numerical pain rated scale (NPRS), Patient rated tennis elbow evaluation (PRTEE), and Hand dynamometer (HD)
Material & Methods: 30 subjects with the CLE were included in the study. They were divided into two different groups; Group A: MFR & Conventional physiotherapy (n=15) and Group B: Conventional physiotherapy (n=15). The predefined treatment protocol was provided for four weeks. The pain, functional performance and grip strength were assessed at baseline and post treatment (4th week) using NPRS, PRTEE and HD.
Result: There was a significant decrease in pain, improvement in functional performance and grip strength *($p<0.05$)* in both the groups. However, MFR group was found to have a greater effect on all outcome measures in CLE subjects
Conclusion: The result of this study indicates that 4 weeks of MFR was effective in improving pain, functional performance and grip strength in Chronic Lateral Epicondylitis (CLE) subjects compared to the control group.
Key Words: *Lateral epicondylitis, MFR, PRTEE, NPRS, Hand Dynamometer.*

INTRODUCTION

Lateral Epicondylitis (LE) or tennis elbow affects about 1-3% of general population [1] and frequently encountered by physical therapist. It is one of the most common lesion of elbow characterized by pain at lateral epicondyle of humerus while dorsiflexing the wrist against resistance. [1] Subjects with LE complains of pain, functional difficulty affecting activities of daily living related to wrist and forearm movements. [3] The grip strength is affected due to voluntary decline of effort to avoid pain and due to wasting of affecting muscles

seen in long standing conditions. The symptoms exacerbate with stressful activities in overuse syndromes but pain may persist even at rest as the condition progress. [4]

The LE is termed as chronic if symptoms last for more than three months. The causative factors of pain in chronic stage are uncertain. However, sensitization of peripheral nociceptors by an increase of neural transmitter in affected tissue may be responsible for the pain. The uncertainty about the causative factor of pain may explain the lack of a clearly effective intervention in CLE. [1]

Various other intrinsic causative factors of LEare enumerated in numerous studies.[5-11] The proposed patho-biology involves a tear of tendon at junction between muscle and bone leading to slow healing due to lack of overlying periosteal tissue. Repetitive micro trauma from overuse or abnormal joint biomechanics may overload the repairing tissue, mechanically distort scar tissue and thus stimulate free nerve endings to evoke mechanical nociceptive pain. The limited blood supply to muscle origin would be further reduced after injury. Patient's age is also a significant factor in reduced vascularity. [12]

Traditionally, treatments for LE have focused primarily on pain control by rehabilitation of muscles. Numerous treatments have been tried for LE including anti-inflammatory medication, corticosteroid injection, electrical stimulation, laser, acupuncture, counterforce bracing or splint, ergonomics, ultrasound, iontophoresis, phonophoresis, exercises (flexibility, strengthening and endurance training), manual therapy techniques, (e.g, transverse frictions, joint mobilization and manipulation, myofascial release, strain and counter strain techniques) etc. [13]

MFR is the application of a low load, long duration stretch (120 – 300s) to myofascial complex, intended to restore optimal length, decrease pain, and improves function. [14] Stanborough, myofascial practitioners believe that by restoring the length and health of restricted connective tissue, pressure can be relieved on pain sensitive structures such as nerves and blood vessels. MFR generally used are either by direct technique MFR or indirect technique MFR. [15] The rationale for these techniques can be traced to various studies that investigated plastic, viscoelastic, and piezoelectric properties of connective tissue. [16, 17] In this study direct technique MFR detailed by Stanborough was used through fingertips and knuckles in CLE subjects. [18]

Currently, no general consensus exists as the most appropriate management for CLE, even after several systematic reviews have been published. [19, 20] A variety of physiotherapy treatments have been recommended which have different theoretical mechanism of action, but having same aim, to reduce pain and improve function. The available evidences comparing the effects MFR Technique in CLE are very few. Therefore our purpose was to find the effectiveness of MFR Technique on pain, functional performance and grip strength in CLE subjects. So the result of this study could be implicated in clinical practice. We hypothesized that MFR would be effective in CLE subject.

MATERIALS AND METHODOLOGY

The subjects from an institutional based Musculoskeletal Physiotherapy outpatient department referred with lateral elbow pain were screened. The subjects were included if age 30-45 years, both gender, CLE> 3 months, unilateral involvement, NPRS score 4 to 8. They were excluded if any history of trauma, surgery, acute infections, any systemic disorders, cervical spine and upper limb dysfunction, neurological impairments, cardiovascular

diseases, osteoporosis, recent steroid infiltration, ossification and calcification of soft tissue, malignancies, athletes, recently underwent physiotherapy interventions in least 3 months, unwillingness to attend all treatment sessions & assessments. Informed consent was obtained from all subjects. Demographic data were collected from the subjects (Table-1). The study obtained ethical clearance from institutional review board.

Table-I: Demographic details

Demographic Details			
Variables	MFR Group*(n=15)*	Control Group *(n=15)*	p-value (p>0.05)
	Mean (SD)	Mean (SD)	
Age	37.20 (±3.35)	37.70 (±2.79)	0.695
Duration (Month)	8.30 (±2.05)	8.8 (±2.44)	0.435
Gender	9 male=60%, 6 female=40%	8 male=53.3%, 7 female=46.6%	
Affected side	10 right=66.6%, 5 Left=33.3%	11 right=73.3%, 4 Left=26.6%	
Dominant side	12 right=80%, 3 Left=20%	13 right=86.6%, 2 Left=13.3%	

Sampling technique

30 subjects diagnosed as CLE were included in study that fulfils the inclusion criteria after detailed physical therapy evaluation. They were randomly assigned with concealed allocation into one of the two treatment groups: Group-A (n=15) MFR & Conventional physiotherapy and Control Group-B Conventional physiotherapy (n=15). A block randomization method was implemented, where subjects randomly chose one of the two enclosed envelopes to determine their group allocation. The next subject was then assigned to remaining group before the process was repeated.

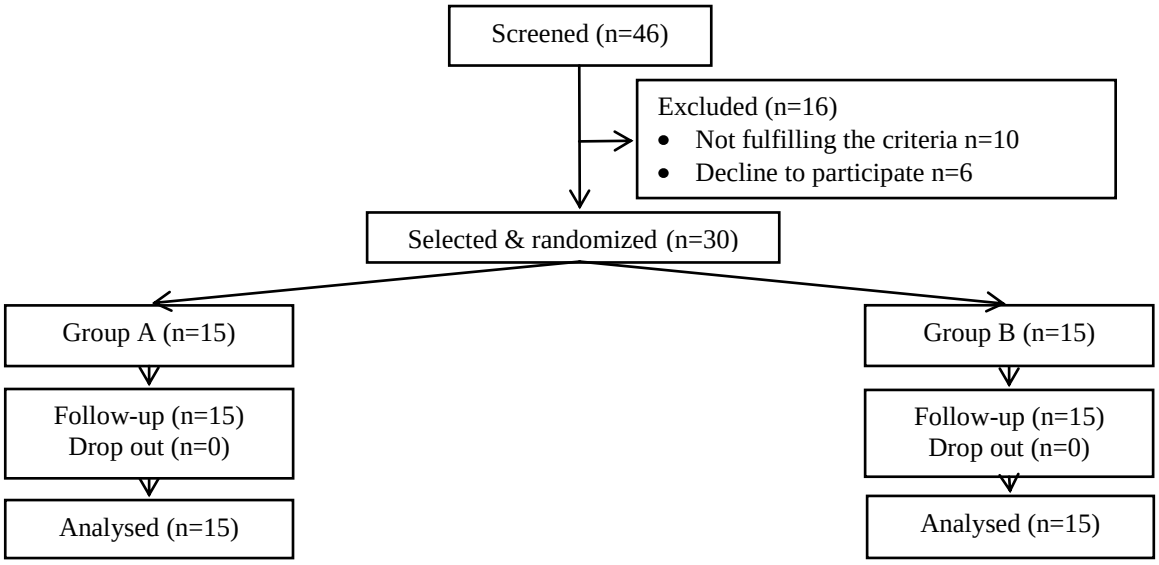

Fig 1: Sampling Flow Chart.

Intervention

Both groups were treated for four weeks by the same therapist. All subjects attended full treatment protocol without drop out. No blinding was done for intervention as well as subjects.

Myofascial Release Technique

The subjects were in supine with affected side shoulder rotate internally, elbow flexion to around 15° and pronation, palm resting flat on table. Therapist stands at the side of table near shoulder and facing ipsilateral hand. Procedure 1: Treating from common extensor tendon (CET) to extensor retinaculum (ER) of wrist began on humerus, just proximal to lateral epicondyle. Using fingertips to engage periosteum and carries this contact inferior to common extensor tendon and then down to extensor retinaculum of the wrist (5min, 2 repetitions). Then, the patient slowly flexes and extends the elbow within range of 5° to 10° during this procedure. Procedure 2: Treating through periosteum of ulna, use knuckles of hand to work over periosteum of ulna (5min, 2 repetitions). Then the patients performed alternating ulnar and radial deviation of wrist. Procedure 3: Spreading radius from ulna, contacts head of ulna with finger pads of one hand and dorsal tubercle of radius with the pads of other. The therapist engaged through to the periosteum and put a line of tension in a lateral and distal direction. It is carried for just a few centimeters with a firm intent to spread the bones (5min, 2 repetitions).Dosage: 30 minutes/session, 3 times a week for 4 weeks. [15, 18]

Fig 2: Treating from CET to ER of wrist.

Fig 3: Treating through ulnar periosteum.

Fig 4: Spreading radius from ulna.

Conventional Physiotherapy

It includes pulse ultrasound therapy and graduated exercise therapy regimen of stretching and strengthening exercises. Stretching: Self-stretching of wrist extensors (wrist being palmar-flexed using other hand) 15 sec hold, 10 stretches/session/day.

Strengthening: Wrist extensor isometric exercise in sitting position with elbow 90°flexion, while unaffected hand applying manual resistance over dorsum of hand and held for 5 to 10 seconds, 15 contractions/ session/day. It was progressed by increasing resistance. [21] ***Pulse ultrasonic therapy (PUS):*** Using ultrasound device, *(Chattanooga Intellect Advanced, Model no-2762cc, Series no-4003)*in seated position, over tenoperiosteal junction of ECRB with1MHz, 1.5 W/cm^2, 1:4 ratios, for 5 minutes 3 session/week total 12 sessions were given. [22] The stretching exercise, strengthening exercise and pulse ultrasound therapy were given to both groups.

Outcome Measures

Pain was assessed by 11 Point NPRS, where the end points are extremes of no pain and worst pain. The NPRS is a reliable and valid pain assessment scale in CLE. [23] Functional Disability was measured by PRTEE, a 15-item questionnaire designed to measure forearm pain and disability in patients with LE. The PRTEE was found to be a reliable, reproducible and sensitive instrument for the assessment of pain and disability in CLE subjects. [24] The hand grip strength was evaluated using baseline hand dynamometer (HD) which has been used extensively in studies for

assessing hand function. The devices have test-retest reliability in various age groups and have been used to validate other instruments. [25]All outcome measures were used to assess baseline value and progressions at 4th week.

Statistical Analysis

All statistical analysis for the subjects in both the groups was done using SPSS 16 for windows software. The level of significant was set at 95 %(p=0.05). Descriptive analysis was used to calculate Mean and Standard deviation. The inter group comparison of demographic details were performed using independent "t" test. Non parametric Mann Whitney "U" Test was used for inter group and Wilcoxon Sign Rank Test for intra group comparisons.

RESULT

The demographic details (age; *p=0.739*, duration of condition; *p=0.631*) of groups were homogenous with *p>0.05(Table-I)*. Pre-treatment NPRS *(p=0.713)*, PRTEE *(p=0.161)*and HD*(p=0.202)* shows no significant difference *(p>0.05) (Table-II) (Figure-5, 6, 7)*. All the subjects in both groups show positive effect in pain, functional performance and grip strength. Pre and post treatment comparison for NPRS *(Group-A: p=0.001, Group-B: p=0.002), PRTEE (Group-A: p=0.001, Group-B: p=0.001)* and HD *(Group-A: p=0.00)*shows significant difference *(p<0.05)* whereas the HD *(Group-B: p=0.063)* did not shows significant difference.*(Table-III) (Figure: 5, 6, 7).* Post treatment inter group comparison of NPRS *(p=0.000), PRTEE (p=0.000)*and HD *(p=0.001)*shows highly significant difference *(p<0.05)*among groups*(Table-IV) (Figure: 5, 6, 7)* proving MFR, an effective treatment in improving pain, functional performance and grip strength.

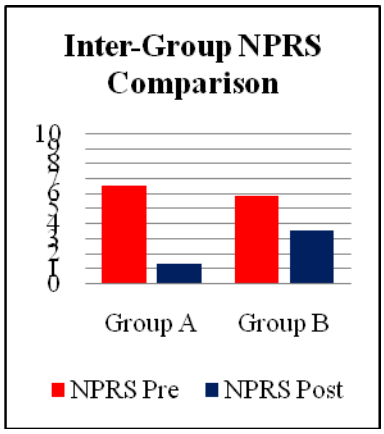

Fig 5: Inter-Group NPRS Comparison

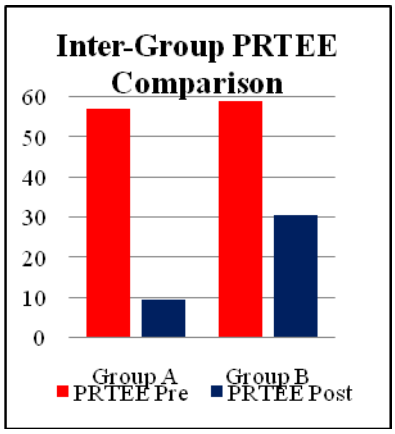

Fig 6: Inter-Group PRTEE Comparison

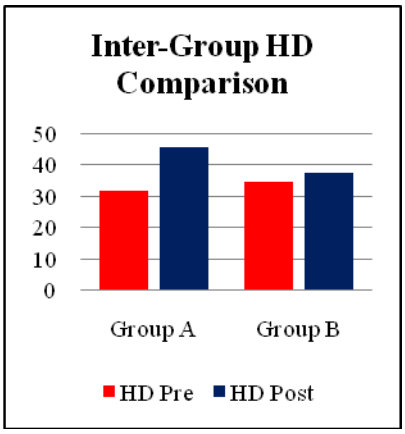

Fig 7: Inter-Group HD Comparison

Table-II: Pre-treatment group comparison.

Pre Treatment Group Comparison							
Scales	MFR Group-A			Control Group-B			P-Value (>0.05)
	Min	Max	Mean (SD)	Min	Max	Mean (SD)	
NPRS	4	8	6.20 (±1.65)	4	8	5.93 (±1.38)	0.713
PRTEE	51	62	57.80 (±3.58)	54	65	59.66 (±3.03)	0.161
HD	22	42	31.86 (±5.50)	20	41	34.53 (±5.47)	0.202

Table-III: Intra Group NPRS, PRTEE and HD Comparison.

Intra-Group Comparison									
		MFR Group-A				Control Group-B			
		Min	Max	Mean (SD)	P-Value	Min	Max	Mean (SD)	P-Value
NPRS	Pre	4	8	6.20 (±1.65)		4	8	5.93 (±1.38)	0.002
	Post	1	2	1.33 (±0.48)		2	6	3.33 (±1.23)	
PRTEE	Pre	51	62	57.80 (±3.58)	0.001	54	65	59.66 (±3.03)	0.001
	Post	5	20	10.13 (±4.42)		20	44	31.26 (±7.47)	
HD	Pre	22	42	31.86 (±5.50)		20	41	34.53 (±5.43)	0.063
	Post	36	52	45.60 (±5.19)		27	46	37.53 (±5.47)	

Table-IV: Pre-treatment group comparison.

Post Treatment Group Comparison							
Scales	MFR Group-A			Control Group-B			P-Value (<0.05)
	Min	Max	Mean (SD)	Min	Max	Mean (SD)	
NPRS	1	2	1.33 (±0.48)	2	6	3.33 (±1.23)	0.000
PRTEE	5	20	10.13 (±4.42)	20	50	31.26 (±7.47)	0.000
HD	36	52	45.60 (±5.19)	27	46	37.53 (±5.47)	0.001

DISCUSSION

The treatment of CLE has been attempted using varieties of intervention in previous studies. [13] None of the studies were strongly suggesting to any specific treatment strategy. This study of 4 weeks MFR technique was found to have significant improvement in pain (NPRS), functional performance (PRTEE) and hand grip strength (HD) compared to control group. The superior effect of MFR group compared to control group is similar to finding of previous authors. [18] This may be the fact that pain relief due to MFR is secondary to returning the fascial tissue to its normative length by collagen reorganization. [18] As with any massage therapy techniques, the analgesics effect of MFR can also be attributable to the stimulation of afferent pathways and the excitation of afferent Aδ fibres, which can cause segmental pain modulation [26] as well as modulation through the activation of descending pain inhibiting systems. [27]

All the outcome measures were recorded at baseline and at 4th week. The domain of pain in NPRS score and functional performance in PRTEE score was found to have more changes than the grip strength domain in HD score. The relative poor outcome in grip strength may be due to the large variation in the duration of condition (5-12 months), as in long standing case there may be wasting of affected muscles and grip become weak. This may lead to the hypothesis that graded griping muscles strengthening exercise may be required to further improve grip strength in CLE subjects. The results of this study may be applied to a population with a clinical diagnosis of CLE subjects. The predominance of male *(GroupA-60%; GroupB-53.3%)*, dominant side *(GroupA-80%; GroupB-86.63%)* with age range *30-45* years *(mean age GroupA-37.20±3.35, GroupB-37.70±2.79)* and right dominant *(GroupA-66.6%; GroupB-73.3%)* are likely to experience CLE in general population.

The study has certain limitations like no blinding procedure performed, the sample size were small and long-term improvements in the pain; functional performance and grip strength with MFR technique were not recorded. The intervention was of only 4 weeks' duration in a small sample size; it is possible that longer treatment protocol may achieve greater effects especially on grip strength. Further controlled studies, confirming these findings with blinding process, larger sample size for longer observation period in acute and sub-acute LE may be considered

to establish whether these interventions result in long term improvement. Future research comparing the effectiveness of MFR techniques with any other treatment which have been proven effective in CLE subjects should be conducted. In summary, our results suggest that MFR technique may improve pain, functional performance and grip strength in CLE subjects.

CONCLUSION

This investigation of MFR technique provided evidence of its use in the treatment of CLE subjects. It can be concluded that 4 weeks MFR technique improves pain, functional performance & hand grip in CLE subjects probably by normalizing the fascial tissue length and excitation of afferent A-δ fibres, which can cause segmental pain modulation. The MFR technique was more effective than that of control group in pain, functional performance and grip strength.

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Conflict of interest

We declare that there were no conflicts of interest in the entire journey of the study.

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