JOURNAL-BASED CME ARTICLE

Effectiveness of Myofascial Release in the Management of Lateral Epicondylitis in Computer Professionals

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Program Overview

Musculoskeletal complaints in the neck and upper extremity and computer work are common in modern society and both show an increasing trend. Lateral epicondylitis is characterized by pain in the external aspect of the elbow exacerbated during elbow extension with the wrist in flexion or by resisted extension of the wrist with the elbow in extension; LE is the most commonly diagnosed elbow condition affecting approximately 1-3% of the general population each year; with workplace activities contributing to 35% to 64% of all cases.

This activity reports on a study that provides evidence that Myofascial Release is more effective than a Control Intervention for Lateral Epicondylitis in Computer Professionals.

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To support the attainment of knowledge, competence, and performance, the learner should be able to achieve the following objectives:

1. List causative factors of Epicondylitis.
2. Describe the application of Myofascial Release (MFR).
3. Differentiate the effect of MFR in treating Epicondylitis.

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ABSTRACT. Ajimsha MS, Chithra S, Thulasyammal RP. Effectiveness of myofascial release in the management of lateral epicondylitis in computer professionals. Arch Phys Med Rehabil 2012;93:604-9.

Objective: To investigate whether myofascial release (MFR) reduces the pain and functional disability of lateral epicondylitis (LE) in comparison with a control group receiving sham ultrasound therapy in computer professionals.

Design: Randomized, controlled, single blinded trial.

Setting: Nonprofit research foundation clinic in Kerala, India.

Participants: Computer professionals (N=68) with LE.

Interventions: MFR group or control group. The techniques were administered by certified MFR practitioners and consisted of 12 sessions per client over 4 weeks.

Main Outcome Measure: The Patient-Rated Tennis Elbow Evaluation (PRTEE) scale was used to assess pain severity and functional disability. The primary outcome measure was the difference in PRTEE scale scores between week 1 (pretest score), week 4 (posttest score), and follow-up at week 12 after randomization.

Results: The simple main effects analysis showed that the MFR group performed better than the control group in weeks 4 and 12 ($P<.005$). Patients in the MFR and control groups reported a 78.7% and 6.8% reduction, respectively, in their pain and functional disability in week 4 compared with that in week 1, which persisted as 63.1% in the follow-up at week 12 in the MFR group.

Conclusions: This study provides evidence that MFR is more effective than a control intervention for LE in computer professionals.

Key Words: Rehabilitation; Tennis elbow.

MUSCULOSKELETAL COMPLAINTS in the neck and upper extremity because of computer work are common in modern society and both show an increasing trend.[1] The prevalence of musculoskeletal symptoms has been found to be greater in the mouse-operating arm and hand than in the other arm or hand in computer professionals. This is independently related to the intensive use of a mouse device and to a lesser extent to keyboard usage, female sex, high job demands, and time pressure at work.[2] Five percent of the participants with moderate to severe pain in the forearm had clinical signs of lateral epicondylitis (LE).[3] LE is characterized by pain in the external aspect of the elbow exacerbated during elbow extension with the wrist in flexion or by resisted extension of the wrist with the elbow in extension.[4] LE is the most commonly diagnosed elbow condition, affecting approximately 1% to 3% of the general population each year,[5,6] with workplace activities contributing to 35% to 64% of all cases.[7] Although the exact cause of this disorder has not yet been elucidated, it is thought to be a degenerative process resulting in vascular proliferation and hyaline degeneration of the extensor carpi radialis brevis (ECRB) and extensor digitorum communis (common extensor origin) at the lateral epicondyle,[5] due to overuse, repetitive forceful movements, poor circulation, strength deficits, or muscle imbalances.[8,9]

Myofascial release (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.[10] It has been hypothesized that fascial restrictions in one part of the body cause undue tension in other parts of the body due to fascial continuity. This may result in stress on any structures that are enveloped, divided, or supported by fascia.[11] 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 involves slow, sustained pressure (120–300s) applied to restricted fascial layers either directly (direct technique MFR) or indirectly (indirect technique MFR). The rationale for these techniques can be traced to various studies that investigated plastic, viscoelastic, and piezoelectric properties of connective tissue.[11-13]

MFR is being used to treat patients with LE, but there are few formal reports of its efficacy. The MFR used in this study was the direct technique MFR, as promoted by Stanborough.[14] During direct technique MFR, pressure is applied directly on restricted fascia; practitioners use knuckles, elbow, or other tools to slowly sink into the fascia and apply a few kilograms of force to contact the restricted fascia, apply tension, or stretch the fascia. The primary objective of the present study was to evaluate the efficacy of MFR in the management of LE in computer professionals, treating fascia in the extensor aspect of the forearm in accordance with the fascial meridians proposed by Myers.[15]

METHODS

This study was carried out in the clinical wing of Myofascial Therapy and Research Foundation, Kottayam, Kerala, India. Inclusion criteria for this study included computer professionals aged 20 to 40 years with a diagnosis of LE on the mouse-operating arm based on the Southampton examination criteria for LE[16,17]; pain lasting ≥1 day in the last 7 days in the lateral elbow region, tenderness over the lateral elbow region, and pain occurring over the lateral elbow region during resisted active extension of the wrist; pain lasting at least 3 months; those working with a personal computer, computer terminal, or equivalent device with a computer mouse; those using a computer for 50% or more of the work day; and those who had completed a baseline Patient-Rated Tennis Elbow Evaluation (PRTEE) scale. Those with a history of trauma to the affected elbow in the preceding 6 weeks, history of elbow instability, previous elbow surgery, any other pathology involving the affected upper limb or cervical spine, use of oral/

List of Abbreviations

ANOVA	analysis of variance
ECRB	extensor carpi radialis brevis
LE	lateral epicondylitis
MFR	myofascial release
PRTEE	Patient-Rated Tennis Elbow Evaluation

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systemic steroids, use of analgesics on more than 10 days a month, and any other treatment for LE during the previous 6 months were excluded from the study. The Research Ethics Committee of the Myofascial Therapy and Research Foundation and Medical Research wing of Mahatma Gandhi University, Kerala, India, reviewed the study and raised no objections from an ethical point of view. Between December 2008 and June 2009, 78 computer professionals were referred to the Myofascial Therapy and Research Foundation with a diagnosis of LE on the mouse-operating arm. Of these, 68 individuals who met the inclusion criteria and provided written informed consent were randomized to the MFR or the control arm of the study. Participants were asked to maintain a pain and medication diary in which any medication or change in pain pattern during the treatment period was to be recorded with date and time. Two evaluators blinded to the group to which the participants belonged analyzed scores from the PRTEE scale.

Interventions

The 2 interventions were provided 3 times weekly for 4 weeks (weeks 1–4), with a minimum of a 1 day gap between the 2 sessions; the duration of each treatment session was 30 minutes.

MFR technique. We used the following treatment protocol for all the patients in the MFR group.[14,15] All techniques were performed on the affected extremity for 30 minutes.

The protocol was as follows.

Client's position: supine. The shoulder was internally rotated, the elbow pronated and flexed to around 15°. The palm was resting flat on the table.

Therapist's position: standing to the side of the table at the level of the client's shoulder and facing the ipsilateral hand.

Technique 1: Treating from the common extensor tendon to the extensor retinaculum of the wrist (fig 1), 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 (5min × 2 repetitions). Patients were trained to slowly flex and extend the elbow within an easy range of 5° to 10° during this procedure.

Technique 2: Treating through the periosteum of the ulna (fig 2), 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 was engaged (5min × 2 repetitions).

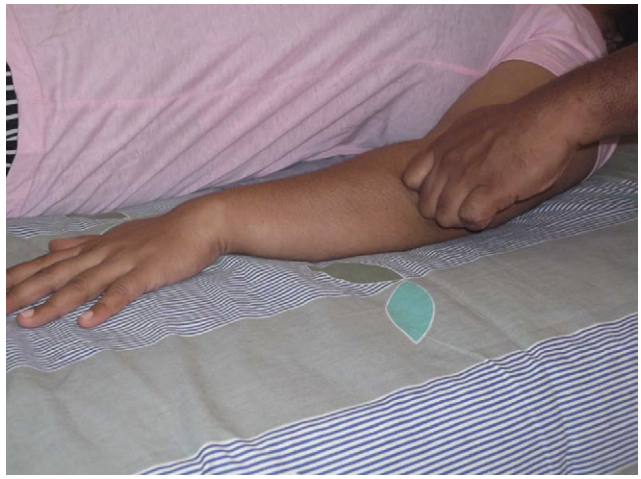

Fig 2. Treating through the periosteum of the ulna.

Technique 3: Spreading the radius from the ulna (fig 3), 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 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).

Control intervention. Patients in the control group received sham ultrasound therapy over the extensor aspect of the forearm in the same 3 areas as the application of MFR (in the other group) for 30 minutes per treatment session (10min × 3 areas) (see figs 1–3), three times a week for 4 weeks. Sham ultrasound therapy units were prepared by removing the ultrasound producing quartz crystal from the treatment transducer head of the ultrasound therapy units. After the completion of the study, patients in the control arm were provided MFR therapy, as advised by the ethics committee.

Patients were asked to rate their pain severity and functional disability on a PRTEE scale before the treatment (baseline), after treatment (week 4), and after 12 weeks (follow-up).

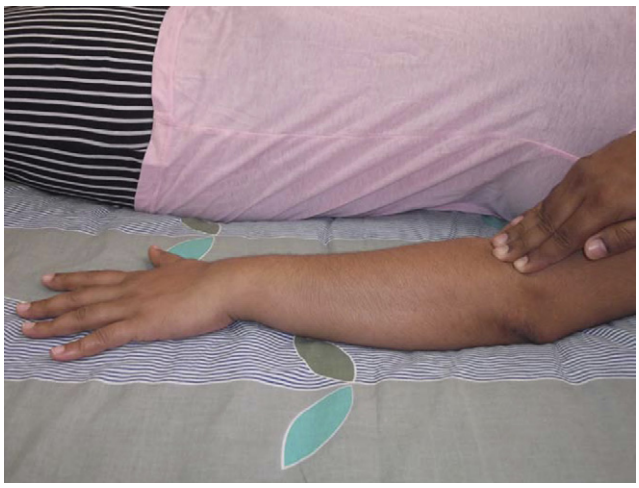

Fig 1. Treating from the common extensor tendon to the extensor retinaculum of the wrist.

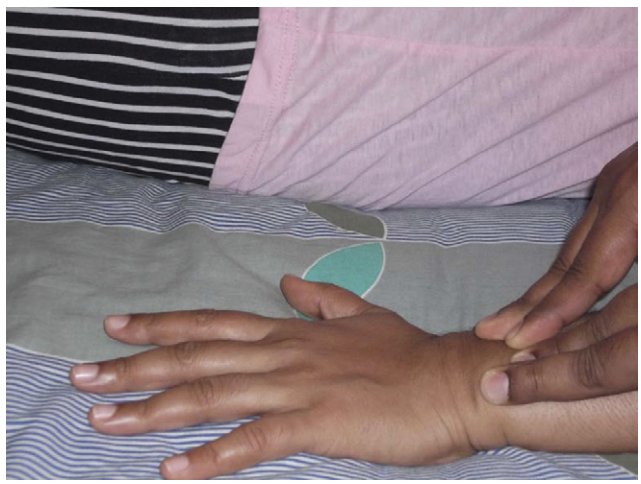

Fig 3. Spreading the radius from the ulna.

Table 1: Summary of Baseline Characteristics

Characteristics	MFR Group (n=33)	Control Group (n=32)
Men:women	13:20	14:18
Age (y)	30.5±4.9	29.3±4.9
Body mass index (kg/m^2)	26.3±1.6	26.2±2.0
Duration of job (y)	4.9±2.3	5.3±2.0
Duration of condition (mo)	8.1±2.8	7.9±3.2

NOTE. Data are mean ± SD or as otherwise noted.

PRTEE scale (formerly known as the Patient-Rated Forearm Evaluation Questionnaire) is a validated LE disability questionnaire developed by Overend et al.[18] It consists of 2 subscales (including pain and functional disability) and are scored with a range from 0 to 10 (0, no pain or difficulty to perform various activities of daily living; 10, meaning worst possible pain or inability to perform). All study participants were advised to take medications only when there were any exacerbations, but were required to record them in their patient diaries, which were analyzed at weeks 4 and 12 after randomization. Practitioners who provided MFR therapy in this study had been trained in the techniques for at least 100 hours and had a median experience of 12 months with the technique.

Statistics

Participants in both groups (MRF group, n=33; control group, n=32) were comparable at baseline, as shown in table 1. The primary outcome measure was the difference in PRTEE scale scores between baseline (pretest score), week 4 (posttest score), and follow-up at week 12 after randomization. Statistical analysis of the data was done by using a 2×3 (group × time) analysis of variance (ANOVA) and 2 × 2 (group × time) and 2 × 3 (group × time) repeated-measures ANOVAs. The between-groups (group), within-groups (time), and mixed-groups (group × time) interactions were examined; then, in accordance with the primary objective of the study, we compared the PRTEE scale scores of the MFR and control groups at different time intervals. A $P<.05$ was accepted as statistically significant.

RESULTS

Of the 68 individuals recruited into this study, 65 participants (MFR group, n=33; control group, n=32) completed the study protocol. One participant from the MFR group and 2 from the control group dropped out of the study without providing any specific reason and their data were excluded from the results presented below. Within the study period, no serious adverse events occurred in either of the groups as recorded in the patient diary. Five patients from the MFR group reported an increase of pain in the first week after initiation of treatment, and this was reported to have subsided within a week without any medications.

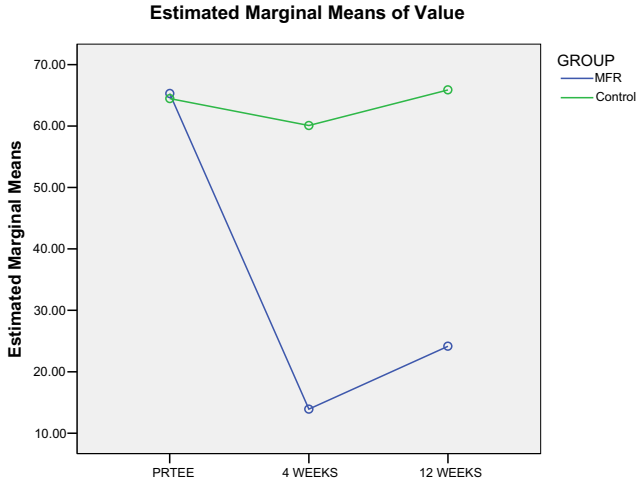

Fig 4. Effects of group and time on value.

The mean differences between groups vary by time. This indicates the possible existence of their interaction effect (table 2). The patients in the MFR group reported a 78.7% reduction in their pain and functional disability as shown in the PRTEE scale score in week 4, whereas patients in the control group reported a 6.8% reduction in their PRTEE scale score in week 4, which persisted as a 63.1% reduction in the follow-up at week 12 in the MFR group, whereas the control group showed a 2.2% increase in their symptoms during follow-up (week 12) in their PRTEE scale score (fig 4). The proportion of responders, defined as participants who had at least a 50% reduction in pain and functional disability between weeks 1 and 4, was 100% in the MFR group and 0% in the control group.

We have examined the effect of group and time on the PRTEE value by conducting, first, a 2-way ANOVA. The dependent variable, the PRTEE value, was normally distributed approximately for the groups, formed by the combination of the group and time because the size of the sample is more than 30 for each group. The test's between-subject effects showed a significant interaction between the effects of group and time on value ($F_{2,189}=522.418$, $P<.001$). The simple main effects analysis (table 3) showed that the MFR group significantly performed better than the control group in weeks 4 and 12 ($P<.001$), but there were no differences between the groups at baseline ($P=.472$).

A 2 × 2 (group × time) repeated-measures ANOVA and a 2 × 3 (group × time) repeated-measures ANOVA were also conducted. The first 2 × 2 repeated-measures ANOVA represented the beginning and week 4, whereas the second 2 × 2 repeated-measures ANOVA represented the beginning and week 12. The significant values of Mauchly spherity tests for both of the 2 × 2 repeated ANOVAs indicate that for the main effects of time, group, and the time × group interaction, the

Table 2: PRTEE Readings of MFR and Control Groups at Different Intervals

Group	Time		
	Baseline	Week 4	Week 12
MFR	65.2±5.0, 63.7–66.9	13.8±2.2, 12.3–15.5	23.9±4.1, 22.6–25.7
Control	64.5±4.9, 62.9–66.1	60.1±5.7, 58.5–61.7	65.9±4.5, 64.3–67.5

NOTE. Data are expressed as mean ± SD, 95% confidence interval of the mean.

Table 3: Pairwise Comparisons of Group and Time

Time	Group I	Group II	Mean Difference (Group I value–Group II value)	SE	*P**	95% Confidence Interval for Difference*
Baseline	MFR	Control	.819	1.135	.472	−1.42 to 3.06
	MFR	Control	−.819	1.135	.472	−3.06 to 1.42.
Week 4	MFR	Control	−.46.185†	1.135	.000	−48.42 to −43.95
	MFR	Control	.46.185†	1.135	.000	43.95 to 48.42
Week 12	MFR	Control	−41.739†	1.135	.000	−43.98 to −39.5
	MFR	Control	41.739†	1.135	.000	39.5 to 43.98

NOTE. Based on estimated marginal means.
*Adjustment for multiple comparisons: least significant difference (equivalent to no adjustment).
†The mean difference is significant at the .05 level.

assumption of spherity is met. On the other hand, for the 2 × 3 repeated-measures ANOVA, the significance values of the Mauchly criterion tests indicate that the main effects of time and the group × time interaction have violated the spherity assumption, so we need to correct the F ratios for these effects. There were significant main effects of time, group, and the time × group interaction. Because all *P* values from the 4 statistics (Pillai trace, Wilk λ, Hotelling trace, Roy largest root) are $P<.001$ (for all the ANOVAs), 2 within-subject (time and group) effects and their interaction effect are significant in the models with the multivariate test.

We observed that the interactions between time and group were significant based on univariate and multivariate methods for all 3 repeated-measures ANOVAs. Significant pairs of MFR and control groups vary at weeks 4 and 12 due to the interaction effect between group type and time.

DISCUSSION

The principal finding of this proof of the concept study is that the MFR intervention tested in this study was significantly more effective than sham ultrasound therapy for decreasing the pain and functional disability of LE.

LE is thought to be a degenerative process resulting in vascular proliferation and hyaline degeneration of the ECRB and extensor digitorum communis (common extensor origin) at the lateral epicondyle.[5] Overuse leads to microscopic tears in the origin of the ECRB with subsequent lack of repair in the tendons and replacement with immature reparative tissue. Although the tensile strength of the healing tendon improves over time, it does not reach the levels of uninjured, healthy tissue. Histopathologic examination shows a degenerative, noninflammatory process with tissue characterized by the presence of disorganized collagen with immature fibroblasts and neovascularization, a process described as angiofibroblastic tendinosis.[5,19,20]

MFR has been reported to reduce pain and improve quality of life in tension headaches,[21] idiopathic scoliosis,[22] Raynaud phenomenon,[23] and in systemic sclerosis.[24] A recent study[25] has shown that treatment with MFR after repetitive strain injury resulted in normalization in apoptotic rate, cell morphology changes, and reorientation of fibroblasts. 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. According to Schleip,[11] under normative conditions, fascia and connective tissues tend to move with minimal restrictions. However, injuries resulting from physical trauma, repetitive strain injury, and inflammation are thought to decrease fascial tissue length and elasticity, resulting in fascial restriction. 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 modulation[26] as well as modulation through the activation of descending pain inhibiting systems.[27] However, the follow-up at week 12 has shown that the treatment effects were less evident compared with week 4 after the treatment. This may be explained because, at the 12-week follow-up, the treatment effect obtained may be disguised by the continuous use of the computer and mouse or by the natural course of the disease.

Study Limitations

One limitation of this trial was that practitioners could not be blinded. A slight improvement over time occurred in the control group at week 4; this could be due to a "meaning response."[28]

CONCLUSIONS

The MFR investigated in this trial was more effective than a control intervention with sham ultrasound therapy for the treatment of LE. A significant proportion of computer professionals with LE might benefit from the use of MFR. The mechanisms underlying these responses merit further investigation.

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