**Nagrale AV, Herd CR, Ganvir S, and Ramteke G. Cyriax Physiotherapy Versus Phonophoresis with Supervised Exercise in Subjects with Lateral Epicondylaigia: A Randomized Clinical Trial. *The Journal of Manual and Manipulative Therapy 2009; 17(3):171-178.***

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**Reviewer:** Linda Metzger 5-4-16

**Design:** Randomized controlled trial

**Objective:** To compare the effectiveness of deep transverse friction massage plus Mill's manipulation (Cyriax physiotherapy) versus phonophoresis plus supervised exercise for the treatment of tenoperiosteal lateral epicondylalgia (LE).

**Population /sample size/setting:**

* A total of 60 participants including 42 females and 18 males, (mean age 35 years) with clinical signs of lateral epicondylalgia were referred by their healthcare providers or recruited through advertisements in local newspapers and health magazines for this randomized clinical trial that was conducted between June 2005 and December 2007 in an outpatient clinic in Wardha, Maharashtra, India.
* The 60 patients were randomly assigned to one of 2 groups. The experimental group (n = 30) received 10 minutes of deep transverse friction massage followed by a single application of Mill's manipulation (Cyriax physiotherapy). The control group (n = 30) received phonophoresis with diclofenac gel, a topical NSAID, over the area of the lateral epicondyle for 5 minutes combined with supervised exercise and static stretching.
* Inclusion criteria included ages between 30 and 60 years, diagnosis with the tenoperiosteal variety of lateral epicondylalgia, and symptoms of one month or longer.
* Exclusion criteria included bilateral elbow pain, previous surgery or trauma to the region,

medial epicondylgia, supracondylar variety of lateral epicondylalgia defined by the presence of tenderness 3-5mm above the lateral epicondyle, cervical radiculopathy, corticosteroid injection within 6 months, and peripheral nerve entrapment.

**Methods/Interventions/Outcome Measures:**

* Study design was a randomized, single-blind study with 8 weeks of follow-up.
* Patients with tenoperiosteal lateral epicondylalgia were clinically identified with the additional criterion of pain with passive wrist flexion with the elbow in extension.
* All eligible patients completed a standardized questionnaire which included information pertaining to patient demographics and symptoms, and also underwent a physical examination.
* All participants were seen 3 times a week for 4 weeks for a total of 12 treatment sessions.
* Outcomes measures included pain using the visual analog scale (VAS), pain-free grip strength, and functional status measured with the Tennis Elbow Function Scale (TEFS). Outcome measures were assessed at baseline, after the first treatment (week 0), and then at 2, 4, and 8 weeks after the first treatment.
* All outcome measures were assessed by an independent evaluator not involved in the treatment who was blinded to the patient's group assignment. Both patients and treating therapists were blinded to the dynamometer readings for grip strength.
* For deep transverse friction massage, the thumb of the treating therapist was used to apply the friction and was positioned with the distal interphalangeal joint in 90 degrees of flexion with the tip of the thumb resting against the lateral epicondyle. The thumb was then drawn across the epicondyle by flexion of the fingers. Friction was applied for a total of 10 minutes.
* For the delivery of Mill's manipulation, the patient maintained full wrist flexion and pronation, while the clinician delivered a high-velocity, low amplitude (HVLA) thrust at the end range of elbow extension.
* The supervised exercise program performed by the control group included static stretching of the extensor carpi radialis brevis followed by eccentric strengthening of the wrist extensors.
* Effect sizes were calculated at 8 weeks for each outcome measure for Cohen's D. Effect sizes of .2 to .5 were regarded as small, .5 to .8 as medium, and greater than .8 as large.

**Results:**

* No significant differences or clinically meaningful differences were observed between the 2 groups at baseline for the background variables or outcome measure scores with the exception of age where a significant difference existed (p=0.002). The mean age of the participants in the Cyriax group was 38 years compared to 32 years in the control group.
* Within group analyses showed that the mean scores for each of the 3 outcome measures for both groups displayed steady, statistically significant improvements from baseline to the end of treatment at 4 weeks (p<0.05 for all measures). Improvements seen at the 4-week follow-up were not maintained with both groups experiencing a significant decline in all outcomes at the 8-week follow-up. However, at the 8 week follow-up, all outcome measures for both groups still remained significantly improved compared to baseline (p<0.05 for all measures). In the Cyriax group, VAS scores decreased from 8.2 to 2.56 between baseline and week 4. In the control group, VAS scores decreased from 8.1 to 4.26 between baseline and week 4. In the Cyriax group, pain-free grip strength increased from 16.53 to 45.33 pounds between baseline and week 4. In the control group, pain-free grip strength increased from 17.33 to 33.73 pounds between baseline and week 4. In the Cyriax group, TEFS scores decreased from 33.66 to 9.06 between baseline and week 4 (lower score = better function). In the control group, TEFS scores decreased from 33.1 to 16.26 between baseline and week 4.
* Between-group analysis indicated that the Cyriax group had significantly better mean scores for all 3 outcome measures at all follow-up periods compared to the control group (p<0.05 for all measures), with the exception of the mean VAS score assessed following the first treatment (0 week) where no significant difference between groups was found. At week 8, the between group difference in VAS scores was 2.44, the between group difference in pain-free grip strength was 13.74 pounds, and the between group difference in TEFS was 8.47.
* Calculated effect sizes at 8 weeks revealed a medium-size treatment effect favoring the Cyriax group for pain-free grip strength and TEFS, both with an effect size of 0.74. A large-size treatment effect favoring the Cyriax group was found for pain VAS at 8 weeks with a calculated effect size of 0.81.

**Authors’ conclusions:**

* The results of this study demonstrate that both the Cyriax group and the phonophoresis with supervised exercise and static stretching group experienced significant improvements in pain, pain-free grip strength, and function following 12 treatment sessions. The Cyriax group experienced better outcomes in terms of pain, pain-free grip strength, and functional status in comparison to those receiving phonophoresis with supervised exercise and static stretching.
* Whereas both groups improved significantly from the initiation of treatment, a between-group comparison revealed significantly greater (p<0.05) improvements regarding pain, pain-free grip, and functional status for the experimental group compared to the control group. The results of this study demonstrate that Cyriax physiotherapy is a superior treatment approach compared to phonophoresis and exercise in managing lateral epicondylalgia.
* Results based on the application of a single treatment technique may raise questions of generalizability as it appears that multi-modal approaches are more typically used in physical therapy practice. The favorable results in the current study indicate the need for future research examining the incorporation of Cyriax physiotherapy as a component in multimodal treatment regimens, thus increasing the generalizability of the findings.
* The long-term effects of treatment remain unknown past 8 weeks. However, the decline in status for both groups at 8 weeks compared to the end of treatment at 4 weeks may suggest a gradual return to baseline following the cessation of treatment. Further research is warranted with longer follow-up periods.
* The results of this clinical trial contribute to the growing body of evidence supporting the use of manual therapy in treating lateral epicondylitis.

**Comments:**

* This study supports the conclusion that both Cyriax physiotherapy and phonophoresis with supervised exercise and static stretching are effective over a period of 4 weeks of treatment in decreasing pain, increasing pain-free grip strength, and improving functional status in people with LE, but Cyriax physiotherapy provides a superior benefit compared to phonophoresis with supervised exercise and static stretching.
* The medium and large effect sizes and the size of the mean differences of the outcome measures between groups indicates that not only were the between group differences statistically significant, but they also met the MCID and were clinically important. The difference in mean VAS scores between groups at 8 weeks was 2.44 points. At 8 weeks, both pain-free grip strength (13.7 pound difference) and the TEFS (8.5 point difference on a 40 point scale) showed over a 20% difference between groups.
* Strengths of this study included the inclusion of an adequate description of the exercise intervention, a mid-term follow-up time, blinded outcome assessors, and the reporting of effect sizes for group differences.
* Limitations of this study included failure to blind subjects to the primary intervention under investigation, failure to adequately describe the randomization process, no sample size or power calculation, no information on dropouts or withdrawals or adverse effects, and no clearly designated primary outcome or primary follow-up time point. With 3 outcome measures and 3 follow-up time points, the primary endpoint was not clear.
* This study lacked a comparable control group or a true no-treatment group which makes it difficult to differentiate between treatment effect and the natural course of the disorder, thus threatening the internal validity of the study. Each group received multiple interventions, so it is not possible to discern which component of the treatment had the greatest impact on outcome. If the Cyriax group had also received exercise and stretching, a more direct comparison of phonophoresis and Cyriax physiotherapy could have been made.
* The reliability and validity of the differentiation between tenoperiosteal and supracondylar LE is unknown and may have led to error during the inclusion/exclusion process. The extra inclusion test of pain with passive wrist flexion for tenoperiosteal LE is likely to have selected more severe cases, and not necessarily differentiate between 2 kinds of LE. Including only tenoperiosteal LE patients in the study, limits the generalization of the findings to only tenoperiosteal LE, instead of to all LE subjects.
* The significant baseline age differences between the 2 groups did not most likely undermine the conclusions of the study. The authors could have adjusted for the age differences by performing a covariant analysis. Since the older group (Cyriax) faired better, and the effect observed did go counter to the general expectation that younger will do better, the conclusion is supported with even more confidence. The age differential is not a big effect modifier in this study.
* The authors did provide the effect sizes and p values for between group differences for all 3 outcome measures, but failed to report confidence intervals, standardized mean differences, or complete tabular data presentation. Between group effect sizes cannot be calculated from the data given. This disqualifies this study as a high quality RCT.
* This trial provided only a short-term follow-up. Since LE is a long-term condition, a longer follow-up would generally have been preferred. No long-term follow-up data was collected past 8 weeks, so the long-term effects of the interventions in the present study remain unknown. It is also possible that a longer follow-up may have diluted the found effect between groups, considering the positive natural course in subjects suffering from lateral epicondylalgia over a longer term.

**Assessment*:***

* This adequate study provides some evidence that both Cyriax physiotherapy and phonophoresis with supervised exercise and static stretching are effective over a period of 4 weeks of treatment in decreasing pain, increasing pain-free grip strength, and improving functional status in people with lateral epicondylalgia, but Cyriax physiotherapy provides a superior benefit compared to phonophoresis with supervised exercise and static stretching.

Note: This article was excluded from the Loew Cochrane review due to the co-interventions of the groups, however, we have included it as the co-interventions appear to fit usual clinical treatment patterns.