**Kochar M and Dogra A. Effectiveness of a Specific Physiotherapy Regimen on Patients with Tennis Elbow. *Physiotherapy* 2002; 88(6):333-341.**

**PMID:none**

**Reviewer:** Linda Metzger 5-11-16

**Design:** Controlled trial (partially randomized)

**Objective:** To compare the effectiveness of the addition of Mulligan’s mobilization to ultrasound therapy (US) and progressive exercises to ultrasound therapy and progressive exercises alone for the treatment of lateral epicondylitis (LE).

**Population /sample size/setting:**

* A total of 66 participants were recruited from the physiotherapy unit in the Department of Orthopaedics at the All India Institute of Medical Sciences. Of these patients, 46 (25males, 21females, mean age 42.5 years) were randomized into 2 treatment groups by a random draw method. The remaining 20, who could not be randomized, comprised the control group. Since the no-treatment control group was not randomized, they are excluded from this critique.
* The 46 patients were randomly assigned to one of 2 groups. The Mulligan mobilization (MM) group (n = 23) received Mulligan mobilization, ultrasound therapy and graduated exercise therapy. The ultrasound (US) group (n = 23) received ultrasound and graduated exercise therapy.
* Inclusion criteria included a typical history of localized pain and tenderness at the antero-inferior aspect of the lateral epicondyle aggravated by gripping and wrist extension activities and relieved by rest, a positive Cozen’s test or resisted wrist extension test, a positive Mill’s test, a positive tender point at the tenoperiosteal junction, full elbow range of motion, and a normal X-ray.
* Exclusion criteria included cervical spine dysfunction, neuromeningeal involvement, radial tunnel syndrome, posterior interosseous nerve syndrome, arthritis, radiohumeral bursitis, ligamentous sprain, bilateral tennis elbow, recurrent tennis elbow, golfer’s elbow, painful shoulder, prior arm fractures, neurological abnormalities, pregnancy, infection, malignancy, corticosteroid injection in the preceding 6 months, and patients treated in the preceding three weeks.

**Methods/Interventions/Outcome Measures:**

* Study design was a randomized study for 2 groups with 12 weeks of follow-up.
* Participants in both groups were seen for a total of 10 treatment sessions over 3 weeks. Both groups then followed a progressive exercise regime for another 9 weeks. They were evaluated at baseline and then at weeks 1, 2, and 3, and finally at the 12th week.
* Four outcome measures were assessed and included pain using the visual analog scale (VAS), isometric grip strength, weight test and patient assessment test. The patient assessment test is a subjective estimation of recovery.
* The same physiotherapist performed all individual evaluations and treatments.
* The weight test measured the ability to lift only the weight of their own hand, and then 1 kg, 2 kg and 3 kg weights, with the wrist in extension and the elbow fully extended and forearm pronated without pain. Isometric grip strength was measured with a dynamometer. For the patient assessment test, patients were asked to assess the status of their pain based on the last 24 hours, from the following alternatives: Worse or unchanged (5), slightly improved (4), improved (3), good (2), and excellent (1).
* Ultrasound therapywas applied at a dosage of 3 MHz, 1.5 W/cm2 and in a pulsed mode for 5 minutes. For Mulligan mobilization, the patient performs the pain-producing movement in conjunction with sustained mobilization known as mobilization with movement (MWM). For each session, 10 MWM’s are performed and then repeated three times. As the patients’ pain lessened, they lifted heavier weights during the procedure.
* All patients performed the exercise therapy regimen at home. The regimen included stretching, and progressive resistive exercises within pain-free limits. The exercises included isometric contractions and active concentric and eccentric exercises. Pain-free isometric contractions of the wrist extensors were initiated and held for 5 to 10 seconds. Concentric extension of the wrist was carried out until the wrist was in neutral, held for five seconds, then slow eccentric work of extensors lowered the hand back to a relaxed starting position. Patients were advised to perform 10 repetitions, 3 times a day. The patients were reviewed every 2 weeks in order to progress the exercises and motivate them to comply with the exercise regime.

**Results:**

* No significant differences or clinically meaningful differences were observed between the 2 groups at baseline for the background variables or outcome measures. There were no significant differences at baseline in VAS, weight test, and grip strength between the groups.
* In the follow-up visit after 12 weeks of therapy, there was improvement in VAS, weight test, and grip strength in both the MM and ultrasound groups, but the MM group showed a significantly greater improvement than the ultrasound group on all 3 outcome measures.
* Within group analyses showed that the mean VAS scores for both groups displayed statistically significant improvements from baseline to the end of treatment at 12 weeks (p<0.01). Pain was decreased in the MM group by 5.9 cm and in the ultrasound therapy group by 1.67 cm on the VAS score from baseline until the end of treatment at 12 weeks. Between-group analysis indicated that the MM group had significantly lower mean VAS scores at 12 weeks compared to the US group (p<0.05).
* Within group analyses for the weight test showed that in the MM group the mean amount of weight that could be lifted increased from 0.35 kg to 1.45 kg at the first week

(p < 0.05), to 3.91 kg at the third week (p < 0.01), and to 4.39 kg at the end of the study period (p < 0.01). The ultrasound therapy group started showing significant improvement from the second week onwards (p < 0.05). Between-group analysis indicated that the MM group was able to lift significantly heavier weights than the ultrasound therapy group (p < 0.01) from the second week onwards.

* Within group analyses for grip strength showed that in the MM group, grip strength increased from 22.74 kg to 26 kg in the first week (p < 0.05), to 30.52 kg in the third week (p < 0.01), and finally to 31.57 kg (p < 0.01) at week 12. The ultrasound therapy group showed significant improvement in grip strength only from the second week

(p < 0.05). Between-group analysis indicated that grip strength for the MM group was not significantly different from the ultrasound therapy group from the third week.

* Within group analyses showed that the patient assessment test score improved for the MM group at 12 weeks (p < 0.05). For the US group, the improvement remained significant for 3 weeks following therapy (p < 0.05), but was not statistically significant at 12 weeks. Between-group analysis indicated that the MM group had significantly better patient assessment test scores at 12 weeks compared to the US group (p<0.05). Most patients in the MM group showed complete recovery. There were five recurrences in the ultrasound therapy group.
* Compliance with the exercise therapy was reported as good.

**Authors’ conclusions:**

* The results of this study suggest that the addition of Mulligan mobilization to a regimen comprising ultrasound therapy and progressive exercises brings about increased and faster recovery in patients with tennis elbow.
* The MM group showed significantly better short- and medium-term outcomes than the ultrasound group. Treatment with Mulligan mobilization plus ultrasound markedly reduced pain, improved grip strength, and the amount of weight lifted.
* In the present study, although the ultrasound group showed improvement on most parameters, there was significantly less improvement than found in the MM group.
* After 3 weeks of treatment, recovery was enhanced over the next nine weeks with exercise therapy. This improvement was more striking in the MM group than in the ultrasound group. A possible explanation of this appears to be a lower baseline of pain in the MM group at the beginning of the exercise regime, due to a better response to MM therapy, so that the MM group could make faster progress with the exercises.
* Improvement in the amount of weight lifted by the MM group could also have been influenced by a learning effect that can further lead to facilitation of neuromuscular mechanisms. Improvement due to this cannot be ruled out. However, learning is one of the effects of manual therapy.

**Comments:**

* This study supports the conclusion that both Mulligan’s mobilization with ultrasound therapy (US) and progressive exercises, and ultrasound therapy (US) and progressive exercises alone are effective over a period of 12 weeks of treatment in decreasing pain, increasing grip strength, and improving the amount of weight lifted in people with LE, but Mulligan’s mobilization with ultrasound therapy (US) and progressive exercises provides a superior benefit compared to US and progressive exercises alone in managing lateral epicondylitis.
* Strengths of this study included the inclusion of an adequate description of the exercise and MM interventions, and a mid-term follow-up time.
* The difference in mean VAS scores between groups at 12 weeks was 4.23 points. The size of this mean difference between groups indicates that not only were the between group differences statistically significant, but they also met the MCID and were clinically significant and important. The MM group improved in grip strength by 4.04 kg and in the weight test by 8.83 kg between baseline and 12 weeks, also indicating clinically important effects.
* The authors did not provide the effect sizes, only p values and graphs, for between group differences for all 4 outcome measures. They failed to report confidence intervals, standardized mean differences, or complete tabular data presentation. The results are not well reported. Between group effect sizes cannot be calculated from the data given. This disqualifies this study as a high quality RCT.
* 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 MM as a component in multimodal treatment regimens, thus increasing the generalizability of the findings.
* Limitations of this study included failure to blind subjects to the primary intervention under investigation, failure to blind outcome assessors, failure to adequately describe the randomization process, no sample size or power calculation, no reporting of effect sizes for group differences, no information on dropouts or withdrawals or adverse effects, and no clearly designated primary outcome or primary follow-up time point. With 4 outcome measures and 2 follow-up time points, the primary endpoint was not clear.
* One limitation of the study was that the same physiotherapist performed all individual evaluations and treatments. It is best when all outcome measures are assessed by an independent evaluator who is not involved in the treatment and who is also blinded to the patient's group assignment. The physiotherapist in this study was not an independent evaluator and was not blinded to group assignment. Both patients and treating therapists could also have been blinded to the dynamometer readings for grip strength.
* This study lacked a comparable, properly randomized placebo 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.
* The authors only reported that compliance with the in-home exercise regimen was good. More information or data should have been provided to ensure that compliance was equal between groups. It was not clear if compliance diaries were required of participants or how the authors came to the conclusion of “good” compliance. It leads us to believe this was just a subjective decision.
* This trial provided only a short to mid-term follow-up. Since LE is a long-term condition, a longer follow-up would generally have been warranted. No long-term follow-up data was collected past 12 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 epicondylitis over a longer term.
* The results of this clinical trial contribute to the growing body of evidence supporting the use of manual therapy in treating lateral epicondylitis.

**Assessment*:***

* This adequate study provides some evidence that the addition of Mulligan mobilization to a regimen comprising ultrasound therapy and progressive exercises is more effective in decreasing pain and increasing pain-free grip strength than ultrasound therapy and progressive exercises alone in the treatment of lateral epicondylitis ***(Kochar 2002).***