**Park JY, Park HK, Choi JH, and et al. Prospective Evaluation of the Effectiveness of a Home-Based Program of Isometric Strengthening Exercises: 12-Month Follow-up. *Clinics in Orthopedic Surgery* 2010; 2:173-178.**

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**Reviewer:** Linda Metzger 4-13-16

**Design:** Randomized controlled trial

**Objective:** To investigate the effectiveness of a home-based program of isometric strengthening exercises for the treatment of lateral epicondylitis (LE).

**Summary of Results:**

* A total of 31 participants were divided into 2 treatment groups: 1) an immediate exercise group, and 2) a delayed exercise group.
* The isometric strengthening exercise protocol was the same in both groups. Those in the immediate exercise group began exercising immediately after the first visit. Participants in the delayed exercise group began exercise after receiving oral NSAID medications for the initial 4 weeks.
* In the muscle strengthening exercise program, the arm and wrist are held out extended in the “stop traffic position” for a static hold of 10 seconds. Each set is composed of 50 repetitions and 4 sets are performed daily for a total of 200 repetitions each day for 12 months.
* Outcomes measured at 1, 3, 6, and 12 months were 1) a pain visual analogue scale (VAS), 2) the modified Nirschl/Pettrone score, and 3) the Mayo elbow performance score (MEPS).
* The findings of this study demonstrated that an isometric strengthening exercise program performed early in the course of LE (within 4 weeks) provided clinically significant improvement in terms of reduced pain and improved elbow function within a short period (4 weeks). Both groups improved over the 12 month period, but there was no significant difference in improvements between groups beyond the one month assessment.

**Reasons not to cite as evidence:**

* It is unclear which of the 3 outcomes is the primary outcome. Clinical outcomes measures were the VAS score, the modified Nirschl/Pettrone score, and the MEPS.
* Five participants dropped out of the study during the first month reducing the sample size even further to only 26 at the one month assessment. It is not clear from which group the withdrawn participants were in. The reason for dropping out was no improvement observed.
* Two of the 3 outcome measures (VAS and the modified Nirschl/Pettrone score) showed a significant difference between groups favoring the immediate exercise group at the one month assessment. Since the 5 drop-outs were most likely not included in the one month analysis (however this is not known), these significant results could be drastically altered, if the drop-outs had been appropriately included. If you only evaluate the compliers that stayed in the study, the study is biased, and the results are completely invalid. There was also no significant difference in improvements between groups beyond the one month assessment for any of the outcome measures, but these follow-up results are also biased. Since participants who did not exhibit reduced symptoms after 4 weeks of doing the exercise program were taken out of the study and given other treatments, all follow-up results beyond one month are also invalid.
* The sample size for this study was extremely small (31). No information was provided to indicate that a power analysis was performed to determine if sufficient sample size was obtained to achieve 80% power to detect a difference in means. It is unknown if an adequate sample size was achieved. The study may have been underpowered to find an effect. This represents poor study planning.
* Compliance was tracked by each participant. There were significant differences in reported compliance rates between groups already at the 3 month follow-up, and by 6 months less than half of the participants in both groups were performing the exercises. Lack of compliance was a definite issue in this study, and it is impossible to have valid results if most of the participants are not performing the prescribed intervention. This tells us that in the real world most participants will be unwilling to perform the exercises, and compliance will be poor to dismal. Due to low rates of compliance, this exercise protocol should not be recommended.
* This exercise protocol is unreasonable and impractical and lends itself to not being complied with. It is unreasonable to expect participants to comply with 200 repetitions per day. With a low level of compliance and high drop-outs, it is evident that this exercise protocol is not well liked. If participants don’t like an intervention, compliance is not to be expected. For this reason alone, this exercise protocol should not be recommended.

**Assessment:**

* This inadequate study supports no evidence that a home-based program of isometric strengthening exercises is effective for the treatment of lateral epicondylitis (LE).