**Article Full Title**

Effects of a Proximal or Distal Tibiofibular Joint Manipulation on Ankle Range of Motion and Functional Outcomes in Individuals With Chronic Ankle Instability

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**Paper Abstract**

STUDY DESIGN: Randomized clinical trial.

OBJECTIVES: To determine whether manipulation of the proximal or distal tibiofibular joint would change ankle dorsiflexion range of motion and functional outcomes over a 3-week period in individuals with chronic ankle instability.

BACKGROUND: Altered joint arthrokinematics may play a role in chronic ankle instability dysfunction. Joint mobilization or manipulation may offer the ability to restore normal joint arthrokinematics and improve function. METHODS: Forty-three participants (mean +/- SD age, 25.6 +/- 7.6 years; height, 174.3 +/- 10.2 cm; mass, 74.6 +/- 16.7 kg) with chronic ankle instability were randomized to proximal tibiofibular joint manipulation, distal tibiofibular joint manipulation, or a control group. Outcome measures included ankle dorsiflexion range of motion, the single-limb stance on foam component of the Balance Error Scoring System, the step-down test, and the Foot and Ankle Ability Measure sports subscale. Measurements were obtained prior to the intervention (before day 1) and following the intervention (on days 1, 7, 14, and 21).

RESULTS: There was no significant change in dorsiflexion between groups across time. When groups were pooled, there was a significant increase (P&lt;.001) in dorsiflexion at each post-intervention time interval. No differences were found among the Balance Error Scoring System foam, step-down test, and Foot and Ankle Ability Measure sports subscale scores.

CONCLUSIONS: The use of a proximal or distal tibiofibular joint manipulation in isolation did not enhance outcome effects beyond those of the control group. Collectively, all groups demonstrated increases in ankle dorsiflexion range of motion over the 3-week intervention period. These increases might have been due to practice effects associated with repeated testing.

LEVEL OF EVIDENCE: Therapy, level 2b–. J Orthop Sports Phys Ther 2012;42(2):125-134. doi:10.2519/jospt.2012.3729 KEY WORDS: ankle sprain, CAI, manual therapy, mobilization

**NIH Risk of Bias Tool**

Quality Assessment of Controlled Intervention Studies

**Was the study described as randomized, a randomized trial, a randomized clinical trial, or an RCT**

Yes

**Was the method of randomization adequate (i.e., use of randomly generated assignment)?**

Yes

**Was the treatment allocation concealed (so that assignments could not be predicted)?**

Yes

**Were study participants and providers blinded to treatment group assignment?**

No

**Were the people assessing the outcomes blinded to the participants' group assignments?**

Yes

**Were the groups similar at baseline on important characteristics that could affect outcomes (e.g., demographics, risk factors, co-morbid conditions)?**

Yes

**Was the overall drop-out rate from the study at endpoint 20% or lower of the number allocated to treatment?**

Yes

**Was the differential drop-out rate (between treatment groups) at endpoint 15 percentage points or lower?**

Yes

**Was there high adherence to the intervention protocols for each treatment group?**

Yes

**Were other interventions avoided or similar in the groups (e.g., similar background treatments)?**

Yes

**Were outcomes assessed using valid and reliable measures, implemented consistently across all study participants?**

Yes

**Did the authors report that the sample size was sufficiently large to be able to detect a difference in the main outcome between groups with at least 80% power?**

Yes

**Were outcomes reported or subgroups analyzed prespecified (i.e., identified before analyses were conducted)?**

Yes

**Were all randomized participants analyzed in the group to which they were originally assigned, i.e., did they use an intention-to-treat analysis?**

Yes

**Were the included studies listed along with important characteristics and results of each study?**

Yes

**Key Finding #1**

For patients with chronic ankle instability, the use of proximal or distal tibiofibular manipulations in isolation did not demonstrate improvements in ankle dorsiflexion ROM, balance, functional movement (step-down), and self reported outcomes (FAAM) beyond that of the control group (no treatment).

**Key Finding #2**

All three study groups, proximal tibiofibular manipulations, distal tibiofibular manipulations, and the control group (no treatment), when pooled (main effect time), saw statistically significant improvements in ankle dorsiflexion range of motion at each post-intervention time interval over the 3-week period.

**Key Finding #3**

All three study groups, proximal tibiofibular manipulations, distal tibiofibular manipulations, and the control group (no treatment), when pooled (main effect time), did not see statistically significant improvements in balance, functional movement (step-down), and self-reported outcomes (FAAM) over the the 3-week period.

**Please provide your summary of the paper**

This study assessed the effectiveness of proximal and distal tibiofibular manipulations on individuals with chronic ankle instability (CAI). Specifically, the study assessed how the effect of these manipulation techniques impacted ankle dorsiflexion range of motion (ROM), balance, functional movement via a step down, and self-reported outcomes via the Foot and Ankle Measure Sports Subscale (FAAM). The study was a randomized clinical trial comprised of three study groups: those receiving proximal tibiofibular joint manipulations (n=15), those receiving distal tibiofibular joint manipulations (n=15), and the control group receiving no treatment (n=13). The study was executed over the course of 3 weeks. On day 1, prior to any treatment being administered, baseline measures of ankle dorsiflexion, balance, functional movement via a step down, and the FAAM were all completed. The patients then received their form of manipulation therapy 1 time each week for 3 weeks total. At each therapy session (1x/week), in addition to receiving their respective form of treatment, each patient would re-execute the outcome measures (ankle dorsiflexion, balance, functional movement, and FAAM) to assess if any change had occurred between sessions. Ankle dorsiflexion was measured via a weighted lunge and placing an inclinometer over the tibial tuberosity to measure the tibia angle relative to the ground. Balance was measured by replicating the component of the Balance Error Scoring System (BESS) where the patient balances on a foam pad in a single limb stance for 20 seconds with their eyes close. Functional movement was assessed via a step-down task from a 20cm high step with patients stepping down laterally, bearing weight through their involved limb until the contralateral heel reached the ground. Self-reported outcomes were measured via the completion of the FAAM. The proximal tibiofibular joint manipulation technique received by one group of participants was described as a high-velocity, low-amplitude thrust after bringing the patient to end range flexion and external rotation with the fibular head abutting the therapist’s metacarpal. The distal tibiofibular joint manipulation technique received by one group of participants was also described as a high-velocity, low-amplitude thrust after bringing the distal fibula to end range while stabilizing the distal tibia. The authors of the study concluded that the use of distal or proximal tibiofibular manipulations in isolation did not improve patient outcomes beyond that of the control group (no treatment). The authors did note that both treatment groups and the control group saw statistically significant improvements in ankle dorsiflexion ROM over the 3-week period but no improvements in balance, functional movement (step downs), and self-reported outcomes (FAAM).

**Please provide your clinical interpretation of this paper. Include how this study may impact clinical practice and how the results can be implemented.**

This study was a well-executed and clearly documented study that made sound conclusions and future recommendations based on their findings. Based on the format and execution of the study, the conclusions made by the authors are accurate in that proximal or distal tibiofibular joint manipulations performed in isolation did not enhance outcomes for individuals with CAI beyond those of the control group. However, this conclusion is only accurate within the specific context of the study. One of the most important distinctions the author made in the study conclusions was that the use of proximal and distal tibiofibular manipulations did not prove to be more effective than the control group specifically when these techniques are used in isolation. The study only assessed the effectiveness of these manipulation techniques in isolation, meaning that the patients did not receive any other forms of intervention or did not execute any additional form of a prescribed home exercise plan (HEP). This is a very important distinction to be made, as manual therapy techniques are often viewed to be used in adjunct to other interventions. In this study, the manual therapy techniques were the only therapy provided. Further studies assessing the effectiveness of these techniques when used in adjunct to a HEP would be beneficial to better replicate clinical practice. An additional consideration for the context of this study is the average age of the participants. The participants in this study were recruited from a local university and surrounding community, yielding an average age of about 25 years old across the three study groups. Therefore, these conclusions may or may not apply to patients with CAI that are older than the participants in this study. Additionally, the authors discussed various potential causes for why the control group (no treatment) also saw statistically significant improvement in ankle dorsiflexion. Specifically, they noted that repeated performance of the outcome techniques may have resulted in a practice effect. This hypothesis would mean that with the weekly execution or “practice” of each outcome could yield the participants simply improving their ability to perform the outcome itself, which may be a cause for improved dorsiflexion ROM scores across all three groups. The practice effect as opposed to the actual therapeutic effect of the study groups may have been a reason why improvements in dorsiflexion ROM were seen across all three groups. Ultimately, within the context of this study, it is accurate to say that in isolation, proximal and distal tibiofibular manipulations do not improve outcomes for young adult patients with CAI. But as the author indicates, these conclusions should be used with caution because of the specific context in which the study was executed.