**Article Full Title**

Immediate Effect of Manual Therapy on Tibiotarsal Joint Mobility and Static Balance in Individuals With Diabetes

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**Paper Abstract**

Objectives: The objective of this study was to evaluate the immediate effect of manual therapy on ankle joint mobility and static balance in patients with diabetes. Methods: Forty patients, at a mean age of 59.35 ± 7.85, with type 2 diabetes mellitus and neurologic symptoms according to a Neuropathy Symptom Score protocol with amplitude, were included. The patients were divided into 2 groups: sham group and intervention group, which underwent manual manipulation intervention and 7-day follow-up. Joint range-of-motion analysis was performed using digital goniometry and static discharge of weights assessed by computerized baropodometry with open and closed eyes. The Shapiro-Wilk normality test was used to analyze the distribution. The data showed normal distribution, so the analysis of variance tests followed by Tukey's tests were used. SAS statistical software was used and the significance level was 5%. Results: The results of the intervention group showed an increase in the variable ankle goniometry over time compared to the sham group. The dorsiflexion movement on the right side obtained major gains over time; in addition, plantar flexion increased. Conclusion: Based on the participants evaluated in this study, manual therapy increased the ankle joint amplitude and improved the static balance in individuals with diabetes. Keywords: Ankle Joint; Diabetes Mellitus; Manipulation; Musculoskeletal Manipulations; Osteopathic; Physical Therapy Modalities.

**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

**Key Finding #1**

There were significant statistical differences between pre-intervention and follow-up (7-days post-intervention) measurements in both plantarflexion and dorsiflexion active range of motion only in the intervention group, as well as an increase in peak plantar pressure during static balance between the immediate post-intervention and follow-up (7-days post-intervention) measurements with eyes open only in the intervention group.

**Key Finding #2**

There were no significant statistical differences between the intervention and sham groups regarding plantarflexion and dorsiflexion active range of motion, peak plantar pressure, and static postural balance at any time point (pre-intervention, immediately post-intervention, and 7-day follow-up).

**Key Finding #3**

The sham group received a non-thrust, small mobilization of unspecified grade and duration, and the intervention group received one thrust manipulation at each limited talocrural joint.

**Key Finding #4**

All participants had a five-year or longer history of type 2 diabetes mellitus, limited talocrural active range of motion, and peripheral neuropathy according to the Neuropathy Symptom Score.

**Please provide your summary of the paper**

This simple-blind randomized controlled trial sought to evaluate the immediate and lasting effects of talocrural thrust manipulation on dorsiflexion and plantarflexion active range of motion, peak plantar pressure, and static balance in patients with diabetes, peripheral neuropathy and limited dorsiflexion and plantarflexion active range of motion. The data were analyzed utilizing validated measures outlined in the methods section. The only difference between the sham and intervention groups was whether a small non-thrust mobilization or thrust manipulation was applied to the talocrural joint, respectively. The intensity nor duration of non-thurst mobilization received by the sham group was reported. Although there were no intergroup differences in dorsiflexion and plantarflexion active range of motion, peak plantar pressure, nor static balance, the thrust group demonstrated intragroup improvements from pre-intervention to immediately post-intervention or 7-day follow-up in ankle active range of motion, peak plantar pressure, and static balance. This supports that thrust manipulation at the talocrural joint may be beneficial in improving ankle range of motion and static balance in individuals with diabetes, peripheral neuropathy, and limited ankle range of motion; however, this study does not support that thrust manipulation facilitates significant improvement relative to non-thrust mobilization manual therapy at the talocrural joint in this patient population.

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

The results of this study support the benefit of manual therapy in improving impairments in body structure and function (e.g. limitations in dorsiflexion and plantarflexion active range of motion) and activity limitations (e.g. static balance). As the results from this study do not support any significant differences between non-thrust mobilization and thrust manipulation on ankle active range of motion, peak plantar pressure, and static balance, further research is recommended to better understand any potential differences between types of manual therapy interventions. This research is highly applicable to patients with chronic diabetes and peripheral neuropathy as decreases in proprioceptive sensation at the talocrural joint may lead to limitations in both dorsiflexion and plantarflexion range of motion to promote stability. Therefore, patients who fit this clinical presentation may benefit from manual therapy at the talocrural joint to improve long-term function by improving the available range of motion, plantar distribution of weight, and static balance.