**Article Full Title**

Changes in Ankle Range of Motion, Gait Function and Standing Balance in Children with Bilateral Spastic Cerebral Palsy after Ankle Mobilization by Manual Therapy

**Author Names**

Youn PS, Cho KH, Park SJ

**Reviewer Name**

Kathi Nevsimal, SPT Class of 2024

**Reviewer Affiliations**

Duke University School of Medicine, Doctor of Physical Therapy Division

**Paper Abstract**

The aim of this study was to investigate the effect of ankle joint mobilization in children with cerebral palsy (CP) to ankle range of motion (ROM), gait, and standing balance. We recruited 32 children (spastic diplegia) diagnosed with CP and categorized them in two groups: the ankle joint mobilization (n = 16) group and sham joint mobilization (n = 16) group. Thus, following a six-week ankle joint mobilization, we examined measures such as passive ROM in ankle dorsiflexion in the sitting and supine position, center of pressure (COP) displacements (sway length, area) with eyes open (EO) and closed (EC), and a gait function test (timed up and go test (TUG) and 10-m walk test). The dorsiflexion ROM, TUG, and 10-m walk test significantly increased in the mobilization group compared to the control group. Ankle joint mobilization can be regarded as a promising method to increase dorsiflexion and improve gait in CP-suffering children.

**NIH Risk of Bias Tool**

Quality Assessment of Controlled Intervention Studies

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

Yes

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

Yes

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

Yes

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

Yes

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

No

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

Yes

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

Yes

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

Yes

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

Yes

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

No

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

Yes

1. **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?**

No

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

Yes

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

Cannot Determine, Not Reported, or Not Applicable

**Key Finding #1**

The experimental group showed significant increase in ankle ROM, specifically DF, after receiving joint mobilizations at the ankle for 6 weeks in sitting and standing position compared to the control group who did not receive ankle joint mobilization.

**Key Finding #2**

Study had a small sample size of 32 children making it difficult to generalize to a wider population.

**Key Finding #3**

The study only followed participants for six weeks, it did not compare long-term effects.

**Key Finding #4**

**Please provide your summary of the paper**

This study examined the effects of ankle joint mobilization on 32 school aged children (8 to 14 years) with spastic diplegic CP. All children participating in the study had a gross motor function classification system (GMFCS) level I or II, classified as hypermobile according to a 5-point posterior talar gliding test, able to independently walk 10 meters or more, and able to follow verbal directions. The purpose of the study was to research the effect of ankle joint mobilization over a six-week period, in order to improve ankle ROM, standing balance, and gait in children with CP. Ankle joint mobilization was applied in an anterior to posterior direction at the distal tibiofibular joint, talocrural joint, and subtalar joint. The primary outcome measure of this study was to measure ROM in ankle-dorsiflexion, while the secondary outcomes measures analyzed COP displacement and gait function test (TUG and 10-meter walk test) for the participants. While there was no significant difference between both the control group and experimental group in COP displacement, there was a significant difference between the control and experiment group in regard to ankle ROM and gait. Therefore, ankle joint mobilization in children with spastic CP should be considered as a primary treatment option to improve gait and ROM of the ankle. Although this project was very interesting more research on a larger patient population should be conducted in the future.

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

Ankle joint mobilization in children with spastic CP should be considered as a primary treatment option to help increase dorsiflexion, gait, and standing balance. In order to generalize this information to the public, a larger group of participants need to participate. I think that it would alos be very beneficial to try this on all levels of the GMFCS. This is important because cerebral palsey is one of the most common pediatric diagosis that effect a child’s walking ability. This study impacted my clinical practice because manual therapy in the pediatric population is still relatively new. This study showed that ankle mobilization manual therapy helps increase ROM of the ankle, specifically DF in children with spastic CP (most of the spasticity occurs at the hip, knee, and ankle with the majority at the distal ankle).