

# EFFECT OF CHIROPRACTIC MANIPULATION ON VERTICAL JUMP HEIGHT IN YOUNG FEMALE ATHLETES WITH TALOCRURAL JOINT DYSFUNCTION: A SINGLE-BLIND RANDOMIZED CLINICAL PILOT TRIAL

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## ABSTRACT

**Objective:** The main objective of this pilot study was to explore the effect of chiropractic high-velocity, low-amplitude (HVLA) manipulation on vertical jump height in young female athletes with talocrural joint dysfunction.

**Methods:** This was a randomized assessor-blind clinical pilot trial. Twenty-two female handball players with talocrural joint dysfunction were randomized to receive either HVLA manipulation (n = 11) or sham treatment (n = 11) once a week during a 3-week period. The main outcome was change in vertical jump height from baseline to follow-up within and between groups after 3 weeks.

**Results:** Nineteen athletes completed the study. After 3 weeks, the group receiving HVLA manipulation (n = 11) had a statistically significant mean (SD) improvement in vertical jump height of 1.07 (1.23) cm ( $P = .017$ ). The sham treatment group (n = 8) improved their vertical jump height by 0.59 (2.03) cm ( $P = .436$ ). The between groups' change was 0.47 cm (95% confidence interval, -1.31 to 2.26;  $P = .571$ ) in favor of the group receiving HVLA manipulation. Blinding and sham procedures were feasible, and there were no reported adverse events.

**Conclusion:** The results of this pilot study show that a larger-scale study is feasible. Preliminary results suggest that chiropractic HVLA manipulation may increase vertical jump height in young female athletes with talocrural joint dysfunction. However, the clinical result in favor of HVLA manipulation compared with sham treatment needs statistical confirmation in a larger randomized clinical trial. (*J Manipulative Physiol Ther* 2014;37:116-123)

**Key Indexing Terms:** *Ankle Joint; Manipulation; Chiropractic; Athletes; Randomized Controlled Trial*

**A**nkle joint injuries are very common, costly, and usually associated with physical activity and sports.<sup>1</sup> It has been estimated that 16% to 30% of all sports injuries are related to the foot<sup>2</sup> and that ankle sprains or lateral distortions of the foot and ankle are among

the most common injuries in the age group 16 to 64 years.<sup>3</sup> Several joints, collectively known as the *ankle complex* or the *talocrural joint*, are involved in the movement of the foot. Dysfunctions of the talocrural joint may have multiple causes such as anatomical anomalies of the bones, ligaments, and/or muscles affecting the ability of the joints to function effectively. Decreased mobility as a result of immobilization after a previous injury may also be an important factor in dysfunctional ankle joints.<sup>4</sup> It has been estimated that loss of dorsiflexion in the talocrural joint might increase the risk of a lateral ankle sprain up to 5 times.<sup>5</sup>

Chiropractors and other manipulative therapists traditionally use manipulation, often known as *high-velocity, low-amplitude (HVLA) manipulation*, to normalize joint function.<sup>6,7</sup> A traction, or long-axis, HVLA manipulation is an example of a frequently used manipulative technique for treating dysfunctions of the talocrural joint.<sup>6</sup> Manipulative therapists use active and passive ranges of motion, joint play, and pain provocation testing to detect altered joint mobility and biomechanical dysfunction suitable for

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**Fig 1.** Active manipulation of the ankle. (Color version of figure is available online.)

manual treatment. Research in this area targeting the spine indicates that pain provocation testing may have high intratester and intertester reliability, whereas motion palpation yields higher intratester than intertester reliability.<sup>8</sup> However, the reliability of such tests applied to the foot and ankle is not as well documented. Despite the long-standing popularity of using HVLA manipulation in the lower extremities, there is a general lack of scientific studies examining the effects of such treatment.<sup>9</sup> Thus, perhaps not surprisingly, manipulative therapy was not recommended in a recent evidence-based clinical guideline targeting the diagnosis, prevention, and treatment of ankle sprains.<sup>1</sup>

Previous clinical studies in the area of manipulative treatment of the ankle have yielded various results. Nield et al<sup>10</sup> studied the effect of HVLA manipulation on ankle dorsiflexion in asymptomatic participants. The authors did not find any significant effect and suggested future studies to involve symptomatic participants.<sup>10</sup> Following that route, a study by Pellow and Brantingham concluded that HVLA manipulation of the talocrural joint appeared superior to placebo treatment for reducing pain and increasing ankle range of motion and function in patients with subacute and chronic lateral ankle sprain.<sup>11</sup> In contrast, Andersen et al<sup>12</sup> found no statistically significant changes in ankle dorsiflexion between manipulated ankles and controls in participants with a history of lateral ligament sprain, although the ankles that cavitated displayed greater improvement compared with those that did not gap. Research on HVLA manipulation and ankle proprioception has showed no effect on standing stability



**Fig 2.** Sham manipulation of the ankle. (Color version of figure is available online.)

in healthy participants,<sup>13</sup> whereas participants with chronic recurrent ankle sprain receiving multiple HVLA manipulations of the talocrural joint have showed an increased range of motion and improved proprioception compared with participants receiving a single HVLA manipulation.<sup>14</sup> Other positive findings of manipulative therapy of the ankle in participants with ankle sprain have indicated biomechanical effects such as redistributing the load supports at foot levels,<sup>15</sup> improving ankle range of motion,<sup>16,17</sup> and creating an initial hypoalgesic effect after treatment.<sup>16</sup> Additional effects include distal tibiofibular joint manipulation producing immediate and significant increase soleus muscle activation.<sup>18</sup> A recent literature review targeting manipulative therapy of lower extremity disorders concluded that there is fair to limited evidence for manipulative therapy in the management of ankle inversion sprain.<sup>19</sup> Taken together, previous research indicates an emerging evidence base with some potential clinical benefits for manipulative therapy of the ankle complex. Nonetheless, there is still a general lack of studies examining clinical change in functional performance by such treatment for different populations.

The main objective of this pilot study was to evaluate the feasibility of a study that would explore the effect of chiropractic HVLA manipulation on vertical jump height in young female athletes with talocrural joint dysfunction. Specific objectives included quantifying change in vertical jump height from baseline and follow-up after 3 weeks by randomized group assignment to either active or sham HVLA manipulation, to estimate the appropriate sample size for a full-scale clinical trial based on the pilot trial data, to assess the feasibility of sham treatment and blinding, and to identify potential adverse events relating to the assigned intervention treatments.

## METHODS

### Study Design and Setting

The study design was an assessor-blind randomized clinical pilot trial. The study was conducted in the settings

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