

## **Effect of Ankle Taping and Bracing on Dynamic Balance and Perception of Stability**

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### **Introduction**

Ankle injuries are the most common injury associated with sports participation. A recent study examining NCAA injury data found that 14.9% of all injuries sustained in 15 intercollegiate sports were injuries to the ankle.<sup>2</sup> Taping and bracing are commonly used measures to prevent and/or protect the ankle from injury. Patients often report a feeling of increased stability due to tape and/or brace<sup>3,6</sup>, however previous studies examining the effect of ankle appliances on stability have produced conflicting results.<sup>4,5,7</sup> The purpose of this study was to examine the effect of taping and bracing on dynamic stability, and the perception of stability with and without ankle taping and bracing during dynamic stability testing.

### **Methods**

**Participants:** 21 physically active subjects (12 females, 9 males, age =  $20.76 \pm 1.58$  years, height =  $1.72 \pm 0.11$  m, mass =  $76.38 \pm 12.69$  kg) participated in this study. All subjects were free from lower extremity injury for at least 6 months prior to testing, and did not have a history of vestibular or balance disorders. All subjects signed an informed consent form approved by the university's institutional review board.

**Stability Testing Procedures:** The Biodex Balance System SD (Biodex Medical, Shirley, NY) was used to measure each subject's overall stability index, which represents the variance of foot platform displacement in degrees, from level, in all directions. Dynamic balance was assessed in a single leg (stork) stance during three 20 second trials at stability level 4, which allows for 20° of platform tilt in all directions. A 30 second rest period was provided between each trial. The mean overall stability index score for the three trials was used for statistical analysis.

**Ankle Appliance Application Procedures:** Overall stability and perception of stability were assessed barefoot, with the ankle taped, and braced. Ankle taping was performed by the same investigator for all trials using a standard preventive tape application commonly used by athletic trainers as described by Arnheim including two anchors, three stirrups, close downs, horseshoes, two heel locks per side and two figures' of eight.<sup>1</sup> For the braced condition, participants were fitted with a Swede-O Inner Lok 8 ankle brace (Swede-O, Inc., North Branch, MN) per manufacturer guidelines.

**Perception of Stability Assessment:** Perception of stability was assessed using a 4-point Likert scale (1 = very unstable, 2 = unstable, 3 = stable, 4 = very stable) following each test session. Participants were instructed to think about how stable they felt during the balance testing procedure, and mark the appropriate response after each test. Participants were not able to see the responses from their previous tests.

**Test Procedures:** Assignment of the independent variables was counter-balanced to minimize the possible effects of fatigue associated with the testing procedures. All testing was performed on the participant's non-dominant leg. Prior to testing, participants were familiarized with the balance device and provided practice sessions on the testing procedures to decrease the chance of a learning effect occurring during testing. Participants were provided a 15-minute rest period after the practice sessions. Following the rest period, participants completed the postural stability test in either the barefoot, taped, or braced condition. Following the test of the first independent variable, the participant was provided a 15-minute rest period prior to the testing of

the second independent variable. This procedure was repeated for a third postural stability test for the remaining independent variable.

**Statistical Analysis:** Analysis of variance with repeated measures was used to analyze overall dynamic stability and subject perception of stability between the barefoot, ankle taped, and ankle braced conditions. All tests of significance were carried out at an alpha level of  $P < 0.05$ . A pairwise comparison using a Bonferroni adjustment was used to determine which findings were significant at the 0.05 level.

**Results:** Means and standard deviations for overall stability index and perception of stability are provided in table 1. Significant differences between conditions were not found for overall stability ( $F_{2,40} = 0.288$ ,  $p = 0.751$ ). Significant differences between conditions were found for participant perception of support ( $F_{2,40} = 11.87$ ,  $p = 0.000$ ), with the ankle tape condition significantly different from both the barefoot and braced conditions ( $p = 0.000$  and  $p = 0.026$  respectively).

	Overall Stability Index	Perception of Stability Score
Barefoot	2.31 ± 1.19	2.57 ± 0.60
Ankle Tape	2.18 ± 0.93	3.38 ± 0.67*
Ankle Brace	2.23 ± 0.85	2.90 ± 0.77

Table 1: Overall Stability Index and Perception of Stability by Condition (Mean ± SD)

**Discussion:** The purpose of this study was to determine if taping and bracing of the ankle improved stability, and/or if there was an increased perception of stability with either condition. Results from the current study indicate that ankle taping and bracing do not effect overall dynamic balance in healthy individuals. Participant perception of stability, however, indicates that ankle tape might provide a false sense of increased stabilization of the ankle. Previous studies indicate that taping and bracing does not have an effect on stability<sup>4,7</sup>, and that a placebo effect or perception of increased stability may be caused by the application of tape to the ankle.<sup>3,6</sup> The findings of the current study are in agreement with the findings that ankle taping and bracing does not effect stability, but there may be a perception that tape provides increased stabilization of the ankle.

## References

1. Arnheim DD, Prentice WE. *Principles of Athletic Training*. 10<sup>th</sup> Edition. McGraw Hill, Boston. 2000. pp. 200-201.
2. Hootman JM, Dick R, Agel J. Epidemiology of collegiate injuries for 15 sports: summary and recommendations for injury prevention initiatives. *J Athl Train*. 2007;42(2):311-319.
3. Hunt E, Short S. Collegiate athletes' perceptions of adhesive ankle taping: a qualitative analysis. *J Sports Rehabil*. 2006;15:280-298.
4. Kinzey SJ, Ingersoll CD, Knight KL. The effect of selected ankle appliances on postural control. *J Athl Train*. 1997;32:300-303.
5. Robbins S, Waked E, Rappel R. Ankle taping improves proprioception before and after exercise in young men. *Br J Sports Med*. 1995;29:242-247.
6. Sawkins K, Refshauge K, Kilbreath S, Raymond J. The placebo effect of ankle taping in ankle stability. *Med Sci Sports Exerc*. 2007;39(5):781-787.
7. Tropp H, Ekstrand J, Gillquist J. Factors affecting stabilometry recordings of single leg stance. *Am J Sports Med*. 1984;12:185-188.