

3-29-2023

Determining Ankle Stability in Collegiate Athletes Using the Biodex Balance System

Delayne Rotolo

Georgia College & State University, delayne.rotolo@bobcats.gcsu.edu

Follow this and additional works at: <https://kb.gcsu.edu/grposters>



Part of the [Sports Sciences Commons](#)

Recommended Citation

Rotolo, Delayne, "Determining Ankle Stability in Collegiate Athletes Using the Biodex Balance System" (2023). *Graduate Research Showcase*. 98.
<https://kb.gcsu.edu/grposters/98>

This Poster is brought to you for free and open access by the Graduate Research at Knowledge Box. It has been accepted for inclusion in Graduate Research Showcase by an authorized administrator of Knowledge Box.

Introduction

An ankle injury is the most common lower extremity injury in sports because of the amount of force that goes through the ankle.¹ Understanding the athlete's ankle stability can better inform a medical team on the probability of an ankle injury occurring and help to mitigate the risk.

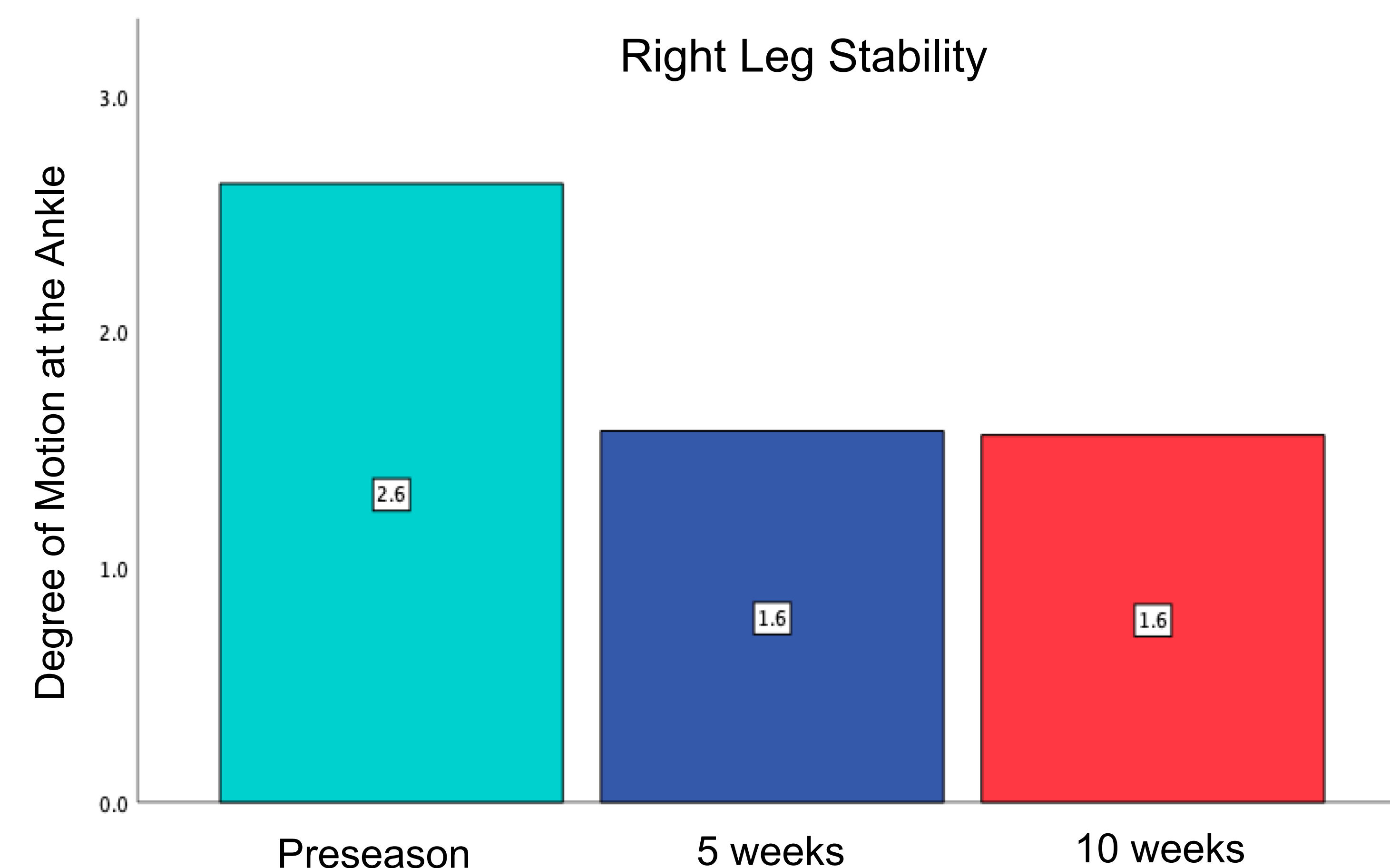
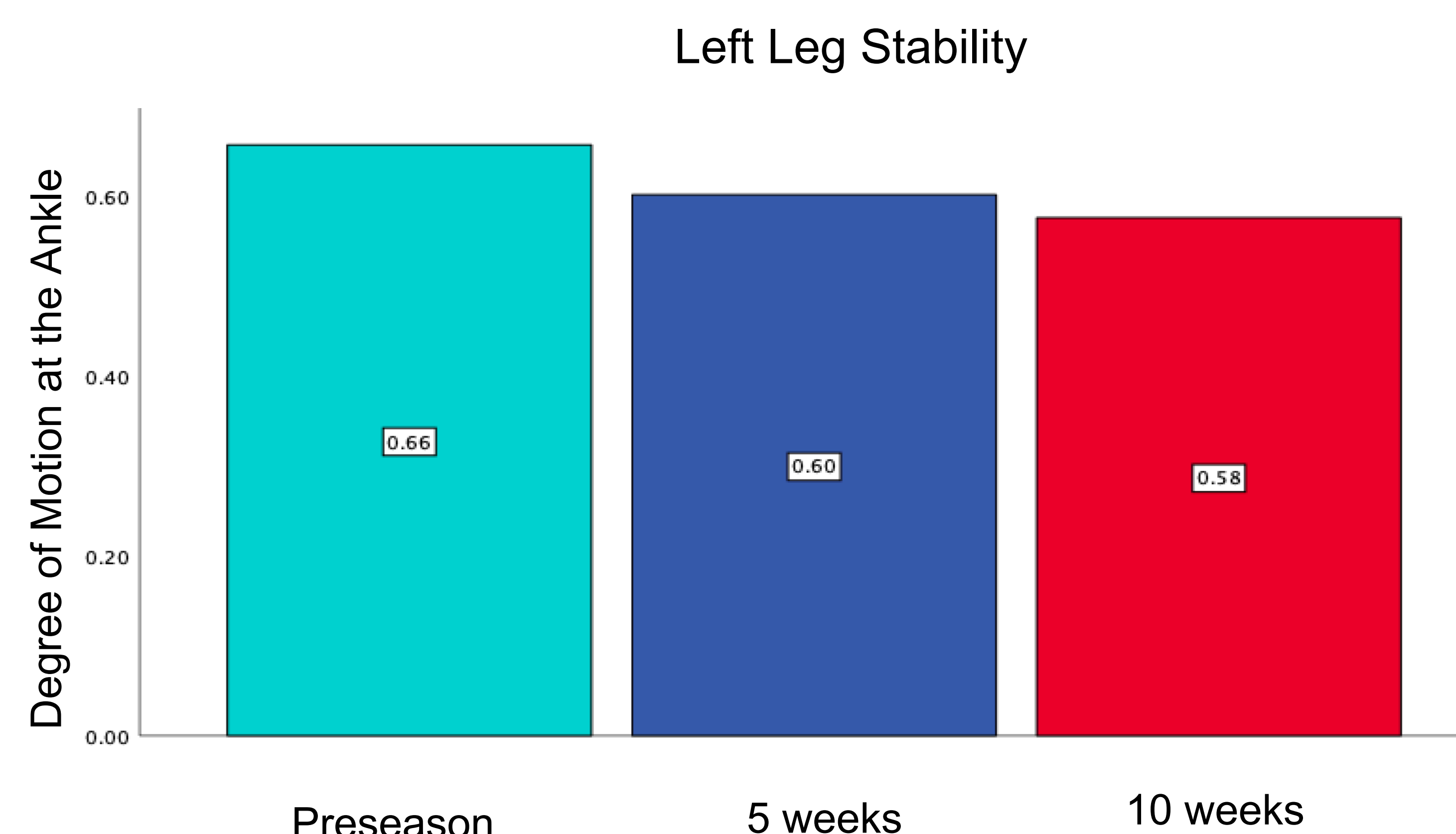
The necessity of knowing that a certain athlete could be injured based on the athlete ankle stability would better prepare the athletic trainer, strength and conditioning coach, and the coaching staff. The athletic trainer can know who to monitor during games and practices, the strength and conditioning coach can implement a more focused workout program for these athletes to prevent injury, and the coaching staff can determine the amount of rest the athlete may need to lessen their probability of getting injured.

The purpose of this study was to determine if ankle stability changes over the course of the athlete's season including pre-season, mid-season, and post-season using the biodex balance system (BBS).

Methods

A total of 30 Division II college athletes (25 female, 5 male; ages 18-22 that compete in either women's volleyball, women's soccer, women's cross country, or men's cross country). Athletes were single leg tested using the Clinical Test of Sensory Interaction and Balance test with the BBS. Stability factors examined with the BBS included: overall stability index, anterior/posterior stability index, medial/lateral stability index, eyes open/closed on a firm surface, and eyes open/closed on a foam surface. The BBS used degrees from level to determine ankle stability (higher degrees meant less stability). Baseline measures were established during the pre-season. Mid-season and post-season assessments were completed by repeating the test again at later time points (5 and 10 weeks, respectively). Data were analyzed with SPSS (general linear models, one-way ANOVAs, and Repeated ANOVAs). The BBS was used to investigate potential fluctuations in ankle stability over an athlete's season.

Average Overall Stability Index Scores



Results

Overall stability of the right leg increased by 1° at mid-season, with the left leg increasing by .6° at mid-season. The higher the degree noted indicated ankle less stability.

No significant difference was found on any of the following trials: eyes open firm surface: $F_{(3,26)}=.338$, $p=.798$; eyes closed firm surface: $F_{(3,26)}=.352$, $p=.788$; eyes open foam surface: $F_{(3,26)}=1.895$, $p=.155$; eyes closed foam surface: $F_{(3,26)}=1.901$, $p=.154$.

Discussion

There was an increase in bilateral ankle stability by mid-season, regardless of sport or sex.

Two strategies were used when an athlete attempted to maintain their balance: hip strategy and ankle strategy.²

The use of ankle strategy is when the athlete's body repositions its COG by moving the whole body and attempting to maintain balance. The ankle strategy then activates the muscles that act on the ankle to compensate for the change in COG.³

When utilizing the hip strategy, the athlete is producing a deterioration in their postural control strategy, which causes an adjustment in the central neural control in the event of impairment in the ankle joint.²

Further investigation is needed to determine the cause of increased ankle stability over time.

References

- Halabchi F, Hassabi M. Acute ankle sprain in athletes: Clinical Aspects and Algorithmic Approach. *World Journal of Orthopedics*. 2020;11(12):534-558. doi:10.5312/wjo.v11.i12.534
- Youssef NM, Abdelmohsen AM, Ashour AA, Elhafez NM, Elhafez SM. Effect of different balance training programs on postural control in chronic ankle instability: A randomized controlled trial. *Acta of Bioengineering and Biomechanics*. 2018;20(2):159-169. doi:10.5277/ABB-01101-2018-02
- Shusstari M, Takagi A, Lee J, Burdet E, Arami A. Balance strategy in hoverboard control. *Sci Rep*. 2022;12(1):4509. Published 2022 Mar 16. doi:10.1038/s41598-022-08291-0