Grant Information Summary:

The Effect of a 4-Week Balance Training Program on Postural Control and Gait Performance in Those with Chronic Ankle Instability

Objective

To investigate the effect of a 4-week balance training program among individuals with CAI on: 1) self-reported function as measured by the Foot and Ankle Disability Index (FADI) and the FADI Sport scales, 2) postural control, and 3) walking and jogging gait parameters.

Subjects

Thirty-one subjects with CAI were randomized into a balance training group (6 males and 9 females: mean age: 22.2±4.5 years, height: 168.9±7.7 cm, mass: 67.3 kg) and a control group (6 males and 9 females: mean age: 22.2±4.5 years, height: 166.3±7.3 cm, mass: 66.3 kg). All subjects were tested twice separated by five weeks. Self-reported function was evaluated using the Foot and Ankle Disability Index (FADI) and the FADI Sport scales. For static postural control, spatiotemporal postural control alterations were measured in the anterior, posterior, and mediolateral directions during single limb stance. For dynamic postural control measures, reach distances of the Star Excursion Balance Test were measured in the anterior, posterior, and mediolateral directions. Walking and jogging gait parameters assessed included rearfoot inversion/eversion, shank internal/external rotation, and their coupling relationship throughout the gait cycle, which consisted of both stance and swing phases.

Design And Setting

This was a randomized controlled trial performed in the Exercise and Sport Injury Laboratory and the Gait and Motion Laboratory at the University of Virginia. There were two independent variables, group (balance training, control) and time (pretest, posttest).

Results

The balance training group demonstrated significant improvements in self-reported function, time-to-boundary magnitude and variability in the anteroposterior and mediolateral directions, and the posterior-medial and posterostral reach distances with the Star Excursion Balance Test after 4 weeks of training compared to the control group measures. Significant alterations in rearfoot and shank rotation in walking and jogging compared to their pretest measures were noted in the balance training group at posttest during both the stance and swing phases of gait. The main finding from the gait parameters was a significant reduction in the variability of the shank/foot coupling relationship in the balance training group at posttest compared to pretest measures and the posttest measures of the control group. No such changes were noted in the control group.

Conclusions

Balance training significantly improves self-reported function, postural control, and select lower extremity joint kinematics during walking and jogging gait in participants whose suffer from CAI.

Measurements

All subjects were tested twice separated by five weeks. Self-reported function was evaluated using the Foot and Ankle Disability Index (FADI) and the FADI Sport scales. For static postural control measures, time-to-boundary measures of center of pressure excursions, including the mean of time-to-boundary minima (magnitude of time-to-boundary measures) and the standard deviation of time-to-boundary minima (variability of time-to-boundary measures) were calculated in the anteroposterior and mediolateral directions during single limb stance. For dynamic postural control measures, reach distances of the Star Excursion Balance Test were measured in the anterior, posterior, and mediolateral directions. Walking and jogging gait parameters assessed included rearfoot inversion/eversion, shank internal/external rotation, and their coupling relationship throughout the gait cycle, which consisted of both stance and swing phases.

Study Background

Ankle sprains are one of the most common injuries in the physically active population. Recurrent ankle sprains and the consequent feeling of the ankle “giving way” is known as chronic ankle instability (CAI). There have been several contributing factors identified associated with CAI including altered postural control gait mechanics. Balance training has been purported to improve functional outcomes in those with CAI; however there is limited evidence regarding the mechanisms of improvement.

Practical Significance Statement

This study demonstrated that participation in 4 weeks of progressive, dynamic balance training significantly improves postural control, gait, and self-reported function in those with chronic ankle instability.