Effectiveness of balance training compared to ankle bracing
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Introduction

Instability of the ankle is one of the main factors contributing to ankle injury, the most common injury among athletes. Chronic ankle instability (CAI) results from deficits in proprioception, joint range of motion, and muscle strength. Therefore, it is important that athletes increase the stability in their ankle internally or externally. The purpose of this study was to determine whether or not balance training can improve a person’s stability over time, and how the results differ when wearing a brace. Researchers have found that ankle bracing is the most effective way to prevent ankle injury when compared to other types of external supports like taping, but these same tests have not been completed to compare bracing to balance training (Sharpe, 1997). The Star Excursion Balance Test (SEBT) is a reliable test that is frequently used by physical therapists to quantify lower extremity performance while also challenging an individual’s stability (Kinzy, 1998). Previously, researchers have used the SEBT as a way to detect deficiencies in the lower extremities, whereas in this study the SEBT is used as a way to quantify balance and detect improvements in stability.

Materials and Methods (cont.)

Before testing began the students were required to remove their shoes, and to watch a video detailing how to perform the SEBT. To begin the pre-test, students stood on their right foot when positioned at the center of the star with their hands on their hips. Then, while moving to the beat of a metronome, they pushed a set of blocks as far as they could before returning to the starting position. The student completed three trials with no support and three more while wearing a brace; they repeated the same steps again on the left foot. When pre-testing concluded, the students completed balance training exercises three days a week for four weeks (Figure 3). After balance training, the students completed a post-test that imitated the pre-test.

Table 1: Pre-training and post-training SEBT differences, mean differences in mean distances between no support and brace worn.

Results

For each student, reach distances (which is an indicator of ankle stability) in each direction were averaged and a paired t-test was used to determine if there was a significant difference in ankle stability between the braced and non-braced persons before and after training. Male and female data were analyzed separately in Minitab® version 15 (results shown in Figure 4). Before training, the results showed a significant difference between braced and non-braced ankle stability in males, and no significant difference in females with p-values of 0.002 and 0.083, respectively. After training, the results did not show a significant difference between braced and non-braced ankle stability in males and females with p-values of 0.668 and 0.849, respectively. This indicates that the brace is not necessary; balance training alone is sufficient to improve ankle stability.

Conclusion

The purpose of this study was to determine whether or not balance training can improve the stability of a person over time, and how the results compare to wearing a brace. After analyzing the data collected, there is no evidence of a difference between the no support results and the brace results after training for both males and females. This suggests that the four weeks of balance training could be as effective as wearing a brace. Therefore, athletes that do not think that ankle braces are comfortable can still decrease their chances of ankle injury if they integrate balance exercises into their daily routine to increase their proprioception, neuromuscular control and dorsiflexion. These findings can be used by physical therapists, athletic trainers and anyone who does any physical activity involving running, jumping or changes in direction because they can incorporate a balance training routine to help themselves or other athletes decrease their risk of ankle injury. Future studies could incorporate a larger sample size and the standardization of the brace type. A longer training period may be beneficial because then it can be determined whether or not balance training will continue to increase stability or if its effect will level off after a certain number of weeks.

References


Figure 1: The diagram shown is an aerial view of the SEBT from the right foot evaluation perspective (Olmstead, 2002). An advantage of using the SEBT is that it is inexpensive but can still produce data reflecting lower limb performance.

Figure 2: Example of the SEBT completed on the right foot with the student’s hands on her hips. This positioning is controlled for all students so extra support is not gained or lost through different placement of the hands. The student was instructed to push the blocks as far as they could while maintaining their balance. If the student lost balance during the test they were instructed to redo the spoke they were on before they could continue.

Figure 3: Listed are the exercises completed during the four week training period. Pictured is a student performing a standing single leg stance, positioned facing the wall to decrease distractions from other students.

Figure 4: Before training there is a greater mean difference in reach between the brace and no support than after training. This indicates that the brace is not necessary; balance training alone is sufficient.