

The Effectiveness of Ankle Braces on Functional Movement Screening and Ankle Joint Range of Motion on Collegiate Division I Volleyball Players

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Abstract

Introduction : Ankle braces are prophylactic apparatuses that attempt to protect the ankle from excessive inversion or eversion. The most common mechanism for ankle injury in a sport that requires jumping is landing (Shaw, 2008). Shaw, Gribble, & Fry state that 58% of basketball injuries and 63% of volleyball injuries occur due to improper landing (Shaw, 2008). There are many types of ankles braces and taping methods used in order to prevent ankle injury and injury reoccurrence. Perceptions of confidence, stability and reassurance were greater with external support during dynamic tasks and self-efficacy was higher with ankle support (Kertanegra, 2017). This suggests that ankle taping and bracing may be advantageous for performance while being used as a preventive measure.

Purpose: The purpose of this research is to examine the effectiveness of ankle braces on functional movement and ankle joint range of motion on female Division 1 collegiate volleyball players. The data will be analyzed to determine if ankle braces impede or help functional movement and ankle joint range of motion.

Hypothesis: It was hypothesized that ankle braces will not affect overall functional performance but will have an effect on ankle joint range of motion and lower body kinematics.

Methods: 17 Division I female collegiate volleyball players from Gardner-Webb University volunteered to participate in this study. They were used to test two types of braced conditions and a non-braced condition while doing the Functional Movement Screening Test, t-drill test, vertical jump test, and block push off test. Between each test, participants rested for 30 minutes in order to eliminate fatigue.

Introduction

The two bracing conditions used in this study were a traditional lace up brace and an active ankle brace, while the control was an unbraced condition. Subjects were randomly assigned to different control groups for each of the ankle braces. The order of the FMS and the functional performance-based tests were counterbalanced for all participants.

Types of Bracing Conditions:

Type I: Lace Up Ankle Brace: Lace up ankle brace that uses laces and Velcro straps that conform to the ankle. The straps and laces can be loosened or tightened based on the needs of the athlete.

Type II : Active Ankle Brace: Semi rigid hinged external ankle brace. Adjusted using a Velcro strap.

Type III: unbraced condition (no brace)



Type I: Lace up Ankle Brace



Type II: Active Ankle brace

Review of Literature

- Halim-Kertanegra (2017) states that the lace up ankle brace provides the most dynamic stability to the ankle than any other brace.
- Newman (2018) found that ankle bracing does not appear to impede functional performance tasks such as sprinting, agility, and sport specific activities.
- Mann (2018) found that ankle range of motion was slightly decreased due to the bracing conditions applied throughout testing, therefore this could possibly contribute to a slight decrease in functional performance.
- Halim-Kertanegra (2017) also states that perceptions of confidence, stability and reassurance were greater with external support during dynamic tasks. Self-efficacy was also higher with ankle support.

Materials & Methods

Participants

- 17 Division 1 Female Collegiate Volleyball Players

Inclusion Criteria

- Female Division I collegiate volleyball player
- Between the ages of 18-22
- No lower extremity injuries in the past six months

Pre-Test Questionnaire and Informed Consent

- Questionnaire given prior to testing to look at demographic information, medical history, and previous knowledge about ankle braces.
- Informed consent from participants obtained prior to testing.

Ankle Brace Testing Session I : Functional Movement Screening

- The order of the FMS and the functional performance-based tests were counterbalanced for all participants.
- Four out of the seven movement patterns of the FMS were completed: Inline Lunge, Overhead Deep Squat, hurdle step, and active straight leg raise.

Ankle Brace Testing Session II: Functional Performance Tests

- All testing was done in one day
- 30 minute period of rest in between each test to reduce fatigue
- Each test was completed once under one of the randomly assigned bracing conditions.
- The functional performance tests performed were t-drill test, block push off, and the vertical jump test.
- These tests were measured using kinematic analysis and calculated in degrees using the Dartfish software.

Data Analysis

- ANOVA to analyze and look at the differences among ankle braces, performance, and ankle joint range of motion.
- Kinematic analysis of the range of motion of the ankle joint will be measured in degrees on the participants dominant leg.

Operational Definitions

Ankle Brace. An external prophylactic apparatus that is designed to support the ankle after injury (Distefano, Padua, & Brown, 2008).

T-drill Test. An agility test that looks at sidestep cutting and inversion range of motion of the ankle joint in degrees (Mann, Gruber, Murphy & Docherty, 2018).

Block Push Off Test. Kinematic analysis of plantarflexion and dorsiflexion of the ankle joint during the block jump and push off analyzed using the MAXTRQ software (Mann et al., 2018).

Vertical Jump Test. Vertical jump was measured using the Vertec jump training system. Kinematic analysis of the plantar flexion and dorsiflexion of the ankle joint during the vertical jump were examined.

Functional Movement Screening Test. The Functional Movement Screen (FMS) if a tool developed by Cook and colleagues in 1997 to help clinicians and health care professionals screen individuals for risk of injury or a dysfunctional or performance-limiting movement pattern. (Physiopedia, 2018).

Pre-Test Questionnaire. A questionnaire given to participants before testing sessions that was administered to collect demographic information, medical history, and previous knowledge about the different types and overall purpose of ankle braces.

Collegiate Athlete. An individual that is eligible and has participated in an intercollegiate sport at the NCAA Division I level.

Discussion

Limitations: One of the limitations of this study was the small number of subjects tested. Only 17 (N=17) female division 1 collegiate volleyball players participated in this study. Another limitation of this study was that each subject came from the same school and are within the same age group. Therefore, the results collected from this study could not be generalized for all female division I collegiate volleyball players.

Future Application: Future research involving athletes that play volleyball at different levels and even previously injured athletes may be necessary in order to understand how each type of ankle brace effects ankle joint range of motion, especially during volleyball specific tasks. Current research is limited due to no previous testing standard as well as the fact that there are many different types of ankle braces commercially available.

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