Ankle injuries, including ankle sprains, are one of the most common injuries in the United States. Research has found that over $1000 is spent on average when treating sprains, along with recreational activities in addition to the cost of time off of work or school.1 Balance training has previously been shown to be an effective form of treatment for chronic ankle instability.2 The removal of visual input is often a progression when performing balance training, however there is a gap in the literature regarding the efficacy of eyes closed balance training when compared to eyes open balance training.

Balance training has been shown to be an effective form of treatment for treating chronic ankle instability by improving functional outcome scores3 and dynamic balance.4 Balance is the result of three sensory systems providing information to the central nervous system, which in turn develops a motor response. The three sensory systems for balance include the vestibular system, visual system, and proprioception.5 A way in which one can challenge balance is to take away one of these systems to force one’s body to rely upon the remaining sources of sensory information. It has been theorized that difficulties with balance in patients with chronic ankle instability can stem from impairments to ankle proprioception.6 It is theorized that eyes closed balance training would yield better results, due to the removal of a balance system. However, a gap in the literature exists when comparing the efficacy of a balance training program deprived of visual input with a program utilizing visual input for effective rehabilitation of ankle sprains.

Participants of the study will be students at Misericordia University between the ages of 18-29 with Chronic Ankle Instability that met our inclusion and exclusion criteria as described below. Participants were recruited through convenience sampling via word of mouth and on social media platforms. The flyer was posted around campus and on social media by the researchers.

Inclusion Criteria: 2 or more ipsilateral ankle sprains 2. Ages 18-29 3. Student enrolled at Misericordia University

Exclusion Criteria: 1. No history of lower extremity injury aside from ankle sprain 2. No history of ankle sprain within 6 weeks prior to study 3. No history of balance disorder, neuronal balance, or other conditions that may affect balance 4. No patients actively participating in an organized sport 5. No history of injury to the spinal or residual sensory/motor dysfunction

This randomized controlled trial will utilize 2x2 independent measures experimental design. The independent variables are group (eyes open vs. eyes closed) and time (pre vs. post intervention).

OUTCOME MEASURES

Outcome measures will be administered by the same licensed Physical Therapist both before and at the end of the training protocol. The administering therapist will understand how to perform each objective outcome measure and be blind as to which group the participant belongs.

Subjective Outcome Measure:
Foot and Ankle Ability Measure (FAAM) – ADL and Sport: Shown to be reliable, responsive, and valid outcome measure for self-detection of deficits in individuals with CAI.7

Objective Static Balance Outcome Measure:
Balance Error Scoring System (BESS) Test: Shown to have interrater reliability that is fair to excellent and moderate criterion related validity when assessing balance in individuals.8

Objective Dynamic Balance Outcome Measure:
Star Excursion Balance Test: Reliable and valid test for determination of reach deficits in individuals experiencing CAI.9 The test-retest reliability has been found to be moderate to good.10 All 9 directions for the SEBT were tested.

ANALYSIS

Power Analysis
A power analysis was performed based on an alpha level of 0.05 and two group, one-tailed design. The desired number of participants to be recruited was 44 in order to account for possible attrition of 10%, a total of 50 participants should be recruited.

Statistical Analysis
Given that multiple outcome measures are being used to assess the effect of our balance training protocol, several statistical analyses will need to be performed. The FAAM and FAAM-Sport, though converted to a numeric score should still be analyzed as non-parametric data. The Mann-Whitney U test will be used to assess for a statistical difference in the mean change in scores between the two groups. The relative distance of each direction of the SEBT will be treated as a dependent variable. The mean relative distance of each direction of the same group will be calculated. The change in each mean value of each group will be used to perform a repeated measures multivariate analysis of variance (MANOVA) to determine if a significant difference exists. The effect of our interventions on the BESS test will be assessed using an independent t-test. The mean score of each group will be calculated after each administration of the BESS, and the mean change between the scores used to perform the t-test. The results of the statistical analyses will be used to assess our hypothesis that the eyes closed group will have greater improvements in outcome measures than the eyes open group.

REFERENCES

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5. Sandrey KE, Vendittoli PA, McKeon PO, Wikstrom EA. Balance modification and training improves sensorimotor function in individuals with chronic ankle instability. J Foot Ankle Res (2014)7:3
9. Wikstrom EA. Priming Exercises performed with eyes open or eyes closed depending on group designation

RESEARCH DESIGN

The Effects of Eyes Open and Eyes Closed Balance Training on Balance Outcome Scores in Individuals Identified as Having Chronic Ankle Instability: A Protocol Paper

Chris Perry SPT, Mitchell Haney SPT, Chris Rehrig SPT, Greg Shultz SPT, Josh Milkes SPT

INTRODUCTION

RECRUITMENT

DO YOU ROLL YOUR ANKLES?

RESEARCH DESIGN

This randomized controlled trial will utilize 2x2 independent measures experimental design. The independent variables are group (eyes open vs. eyes closed) and time (pre vs. post intervention).