Effect of Biomechanical Muscle Stimulation using the swisswing®: Ankle range of motion and perceived ankle stiffness in Injured, college-aged athletes

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Brief Description of the Study

The purpose of this study was to determine whether biomechanical muscle stimulation (BMS) therapy is an effective way to increase ankle range of motion on acute and sub-acute ankle sprains in intercollegiate athletes. We wanted to determine if this therapy in combination with standard operating procedure of ice, compression and elevation increased ankle range of motion more when compared to a control that received standard operating procedure for ankle sprains which was ice, compression, elevation.

The machine used in this study was the swisswing® which is a biomechanical muscle stimulation device that rotated at 20 hertz to provide biomechanical muscle stimulation (via vibration) to the body tissue. More specifically, this device is used to transfer mechanical vibrations to nerve and muscle tissue at frequencies that are similar to the natural muscle tone. Range of motion measurements were taken using a standardized goniometer for plantarflexion, dorsiflexion, inversion and eversion both pre-and post-treatment for the groups. Additionally, a perceived stiffness scale was used (0-10 likert scale) pre- and post-treatment with 10 indicating the most stiffness.

Intercollegiate athletes served as the participants in this study. Each participant had ankle range of motion taken prior to treatment. The control had standard operating procedure for ankle sprains which included ice, compression and elevation for 20 minutes followed by post-treatment measurements as listed above. The experimental group had pre-treatment measurements taken as well followed by standard operating procedure of ice, compression and elevation supported with biomechanical muscle stimulation treatment.

The experimental treatment protocol consisted of the following BMS positions on the swisswing® machine for two minutes each at 20 hertz: Bottom of foot resting on the drum of the machine, heels resting on the drum of the machine, gastrocnemius belly (calf muscle) resting on the drum of the machine. Post-treatment measurements were taken.

Summary of Study Findings

The following figures are from participants who reported with an ankle (N=5) injury. These individuals were treated on three separate days. On days one and two they underwent a control treatment then treatment with the swisswing®. Day three did not have a control treatment. The data below is from that of day 2. Only one day is presented as each day appeared to yield similar results (this is the case statistically). Each day participants exhibited no improvement or a worsening of symptoms during the control treatment and a significant improvement in symptoms when undergoing the swisswing® treatment. These improvements appear to be acute and did not carry-over from one day to the next. However, more participants followed over a longer period of time would be necessary to fully evaluate the chronic effects of this therapy. The present data support a significant, positive, acute impact of the swisswing® in participants with ankle injury. Figures 1, 2, and 3 reflect the significant findings relative the ankle range of motion in the control and experimental groups, and perceived stiffness, respectively.

Figure 1. Ankle flexibility (degrees) in the control condition

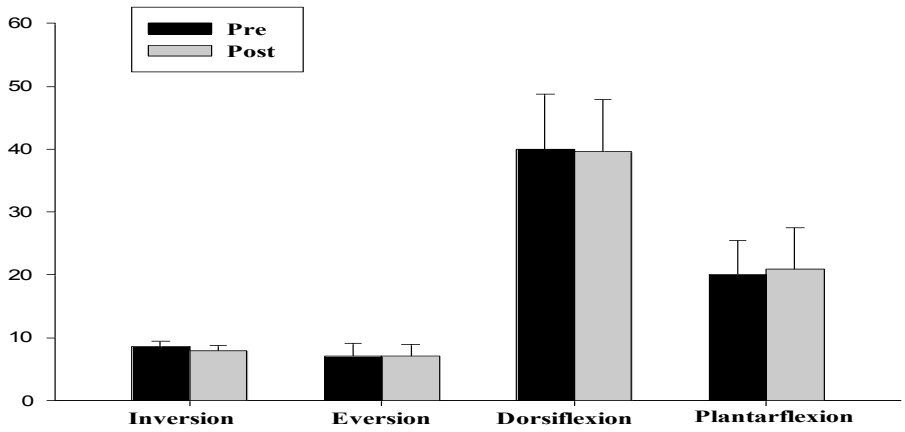

Figure 1. Ankle flexibility (in degrees) assessed via standardized goniometric measures, before and after a control treatment. Paired samples T-test demonstrate no significant differences (P≥0.07) between pre and post for any measure of flexibility.

Figure 2. Ankle flexibility (degrees) in the treatment condition

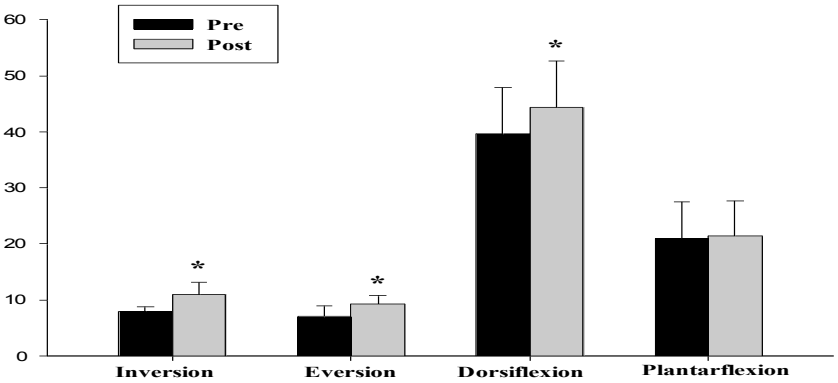

Figure 2. Ankle flexibility (in degrees) assessed via standardized goniometric measures, before and after the experimental treatment. Paired samples T-test demonstrated significant improvements* (P<0.05) between pre and post for inversion, eversion and dorsiflexion but not plantarflexion (P= 0.8).

Figure 3. Ankle stiffness (Likert)

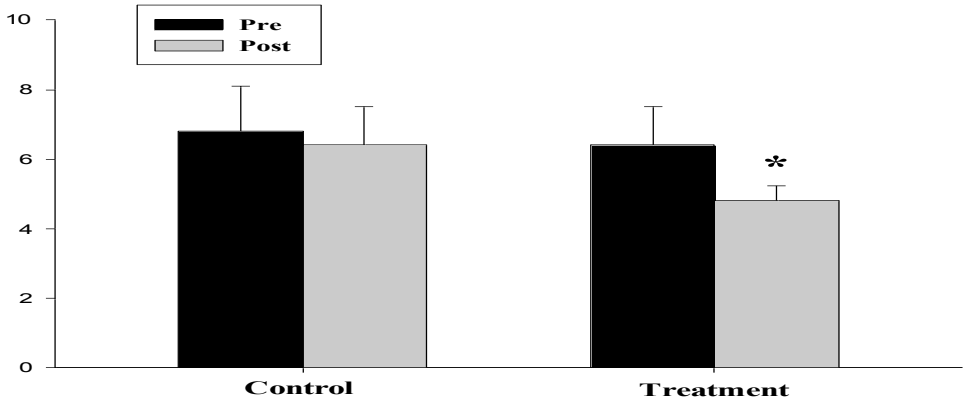

Figure 3. Ankle stiffness, assessed via Likert scale, before and after treatment or a period of no treatment (control). Paired samples T-test demonstrates a significant reduction (P<0.02) in perceived ankle stiffness following treatment* with no change in stiffness in the control condition.