Effect of Biomechanical Muscle Stimulation using the swisswing®: Hamstring flexibility and perceived hamstring 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 reduce pain and increase range of motion on acute and sub-acute hamstring strains in intercollegiate athletes. The purpose was to determine if this therapy in combination with standard operating procedure of ice, compression and elevation reduced stiffness and increased range of motion in the hamstring more when compared to a control group that will receive standard operating procedure for hamstring strains which is ice, compression, and 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. The goals for this study were to determine if biomechanical muscle stimulation reduced stiffness and range of motion more than standard operating procedure as measured by a likert-type stiffness scale (0-10) and a standardized goniometer for straight leg hip flexion both pre-and post-treatment for the measurements.

Intercollegiate athletes served as the participants in this study. Each participant completed a stiffness scale rating and had their range of motion (straight legged hip flexion) taken prior to treatment. The control had standard operating procedure for hamstring strains which included ice, compression and elevation for 20 minutes followed by post-treatment measurements. The experimental group had pre-treatment measurements taken as well followed by standard operating procedure of ice, compression and elevation supported with BMS treatment.

The experimental treatment protocol consisted of the following BMS positions on a swisswing® machine for two minutes each at 20 hertz: Standing Gluteals – standing with Buttocks resting on drum; Standing Hamstrings – standing with hamstring resting/draped over drum; and seated gastrocnemius (calf) – seated with belly of the calf draped over the drum. Post-treatment measurements were taken.

Summary of Study Findings

The following figures are from participants who reported with either a hamstring (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 hamstring injury. Figures 1 and 2 reflect the significant findings relative the hamstring range of motion in the control and experimental groups, and perceived stiffness, respectively.

Figure 1. Hamstring flexibility (degrees)

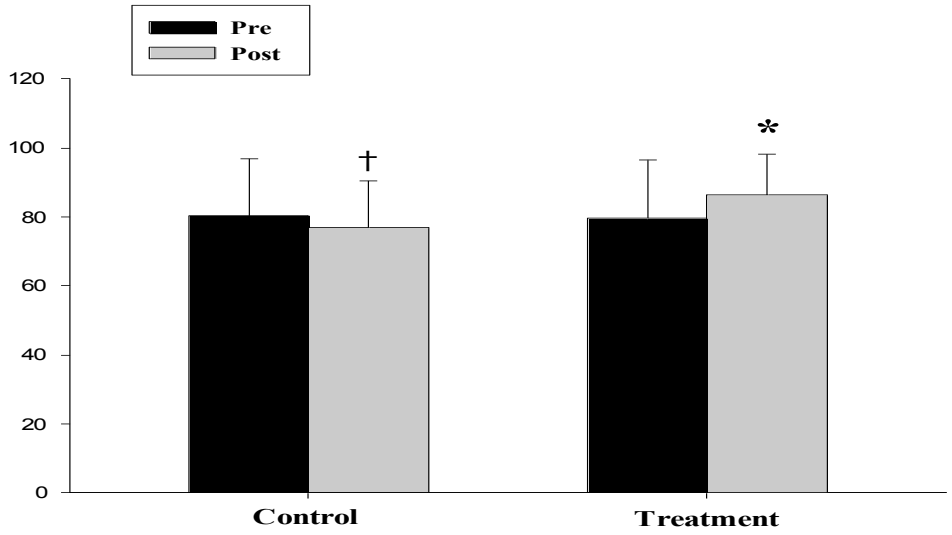

Figure 1. Hamstring flexibility (in degrees, assessed via straight leg goniometric measures, before and after treatment or a period of no treatment (control). Paired samples T-test demonstrates a significant increase ($P<0.001$) in measured hamstring flexibility following treatment* with a significant reduction ($P<0.02$) in flexibility in the control condition†.

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Figure 2. Hamstring stiffness (Likert)

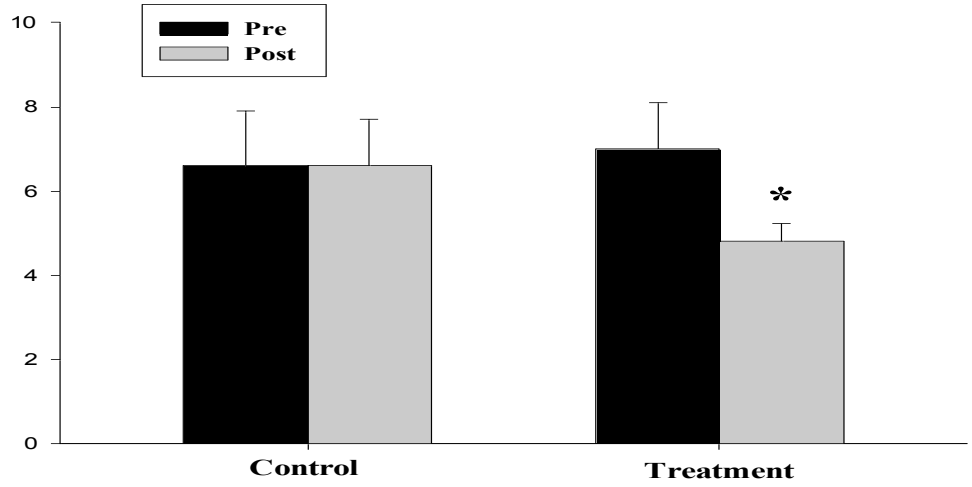

Figure 2. Hamstring stiffness, assessed via Likert scale, before and after treatment or a period of no treatment (control). Paired samples T-test demonstrates a significant reduction ($P<0.01$) in perceived ankle stiffness following treatment* with no change in stiffness in the control condition.