THE EFFECT OF COMPRESSION PANTS ON POSTURAL STEADINESS BEFORE AND AFTER TIRING EXERCISE

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INTRODUCTION

Postural steadiness is often compared between groups of healthy and unhealthy individuals and between young and old adults (Prieto et al., 1996). It has also been examined in attempts to predict falling in older adults and to determine the relative importance of vision, vestibular, and somatosensory systems in subjects of all ages (e.g., Cornilleau-Peres et al., 2005; Mackey & Robinovitch, 2005).

The popularity and prevalence of core-strengthening programs developed from dance has led to assessments of postural stability in young, healthy individuals. For example, Gerbino and colleagues recently found that college-age dancers are superior to collegiate soccer players in measures of sway index and center acquisition time (Gerbino et al., 2006).

Following this line of reasoning, balance measures may also be used to assess training aids. Manufacturers of compression pants (i.e., tights), for example, advertise that their product adds support to the musculature of the lower extremity. Overall balance may be an additional benefit of this improved support. The present study was designed to examine the effects of compression pants on postural steadiness before and after tiring exercise in a group of young, healthy women. It was expected that compression pants would improve postural steadiness.

METHODS

Eleven women, who were part of a larger study, visited the lab on three occasions, which were separated by at least two days (Mean ± SD: Age = 25.6 ± 7.3 yrs; Body Mass = 58.7 ± 5.3 kg). The three test sessions corresponded with three clothing conditions (running shorts, brand1 compression pants, brand2 compression pants), which were assigned randomly to each participant. Postural steadiness was assessed early in each session and then after tiring exercise, which included vertical jumping, an anaerobic power test, knee extensor muscle testing, and a 30-min treadmill run.

For postural steadiness measures, participants stood quietly on an AMTI force platform for 30 s, while ground reaction force (GRF) data were collected at 240 Hz. Subjects were instructed to keep their hands on their waist and direct their vision straight ahead. All tests were done with eyes open.

Center of pressure (COP) data were calculated from the final 20 s of GRF data. Dependent variables included: the root-mean-square distance from the mean COP (RDIST); the mean velocity of the COP (MVELO); and the mean frequency (MFREQ) of the COP (Prieto et al., 1996). A two factor repeated measures analysis of variance (prepost, clothing, prepost-clothing interaction) was used to detect differences in each dependent variable ($\alpha = .05$).

RESULTS AND DISCUSSION

There was a main clothing effect for MVELO as shown in Figure 1 and a main effect between pre and post testing times for MFREQ as shown in Figure 2. There were no significant differences for RDIST. Magnitudes of all measures were consistent with previously reported values from young subjects (Prieto et al., 1996).

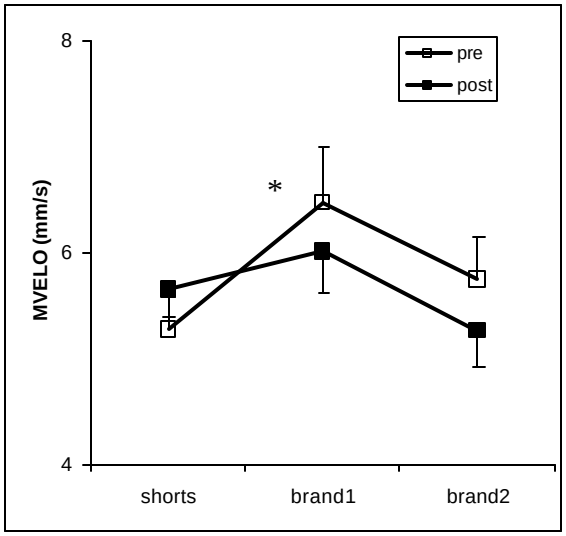

Figure 1: Mean velocity (± SE) of the COP (MVELO) for all conditions.
*brand1 > shorts, brand2 ($p < .05$)

Based on interpretations of Prieto et al. (1996), our findings show that although the level of postural steadiness was similar between all clothing conditions (i.e., no change in RDIST), the rate of regulatory activity associated with maintaining that level of postural steadiness was elevated in brand1 compression pants (MVELO). This change is likely due to a mechanical factor: brand1 compression pants effectively increased the leg stiffness, which did not reduce RDIST but only increased MVELO. This interpretation is analogous to the neural strategy of older adults stiffening the legs by increasing muscle coactivation at the ankle joint (Benjuya et al., 2004). The difference is that older adults also showed increased RDIST. The decrease in MFREQ after exercise was amplified in both compression pants conditions (see Figure 2).

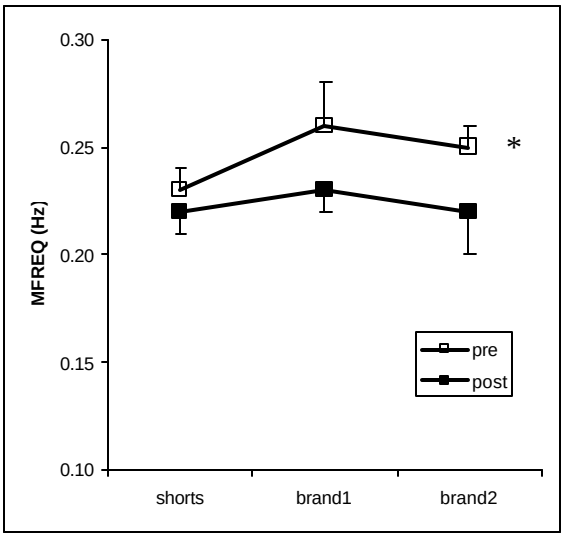

Figure 2: Mean frequency (± SE) of the COP (MFREQ) for all conditions.
*pre > post ($p < .05$).

In conclusion, after tiring exercise, there was no difference in the level of stability attained by subjects when they were wearing shorts or compression pants (variable RDIST). There was a difference in MVELO between clothing conditions and a difference in MFREQ between pre and post exercise conditions. Some compression pants may increase leg stiffness, similar to the neural strategy adapted by older adults.

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