LIMITS OF STABILITY AND ADAPTION TO ROCKER BOTTOM SHOES

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INTRODUCTION

Balance, posture, and stability during standing and locomotion are essential. Numerous balance training strategies have been developed as a means of maintaining or improving postural control. In 1996, Masai Barefoot Technologies in Switzerland introduced rocker bottom sole (RBS) shoes to simulate an unstable shoe surface.

RBS shoes have generated controversy on whether or not the claims of improving posture, reducing pain, and "shaping" musculature are true [1]. In May of 2012, the Federal Trade Commission released a statement regarding a lawsuit against a company producing an RBS shoe that claimed to increase lower extremity strength, weight loss, and muscle activation [2].

RBS shoes provide an unstable surface and may help train postural control. However, the effects of RBS shoes on the limits of stability (LOS) are not well understood. The aims of this study were: 1) to evaluate the LOS when wearing RBS shoes compared to regular shoes, and 2) to evaluate if there are LOS changes over a 6-week period of wearing RBS shoes.

METHODS

Eleven volunteer female nursing and health sciences' university students with no lower extremity impairments participated in the study. The subjects age was 27±5 years, height was 1.64±0.04 meters, weight was 60±5 Kg, and shoe size was 8±0.3.

The Subjects' LOS with RBS shoes and with regular shoes were tested randomly during 3 testing sessions: baseline, 3 weeks, and 6 weeks. The tests were performed with the subjects standing on a Neurocom SMART EquiTest equipment with the software version 8.3.3 (Figure 1).

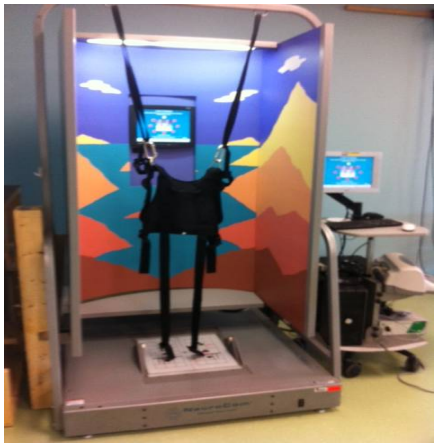

Figure 1: Neurocom SMART EquiiTest.

The RBS shoes used were from the Therashoes brand and were provided by Comfort Technology Systems, LLC. The sponsor played no role in the design, execution, analysis and interpretation of data, or writing of the study.

The test consisted of the subject maintaining their center of mass within their base of support, and displacing their center of mass away from the center of their base of support to 8 separate targets without taking a step. The LOS were evaluated based on movement velocity, end-point excursion, and directional control. The mean and standard deviation of the 8 directional trials were calculated. A composite was taken from the front targets (front, front-right, and front-left) and back targets (back, back-right, and back-left). Shoe types were compared using paired t-tests, and testing sections were compared using one-way ANOVAs.

RESULTS

At baseline, the mean maximal velocity with the RBS shoes in the front and back composite directions tended to be lower than with regular shoes (4±3 vs. 5±2 deg/sec, and 4±1 vs. 6±4 deg/sec).

Subjects tended to have better directional control when wearing regular shoes than RBS shoes. The differences in front directional control (Figure 2) were statistically significant at weeks 3 and 6 ($p<0.015$).

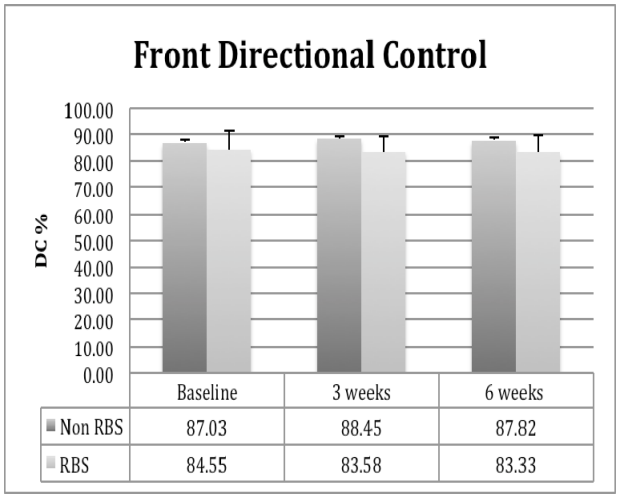

Figure 2: Percentage of Front Directional Control (DC%) at baseline, week 3, and week 6 with regular shoes (Non RBS) and with RBS shoes.

There were no statistically significant differences between the shoe conditions in back directional control (70±27% with RBS shoes vs. 71±8% with regular shoes).

There were statistically significant differences between shoe conditions in front end-point excursion (Figure 3) at baseline and week 3 ($p<0.014$).

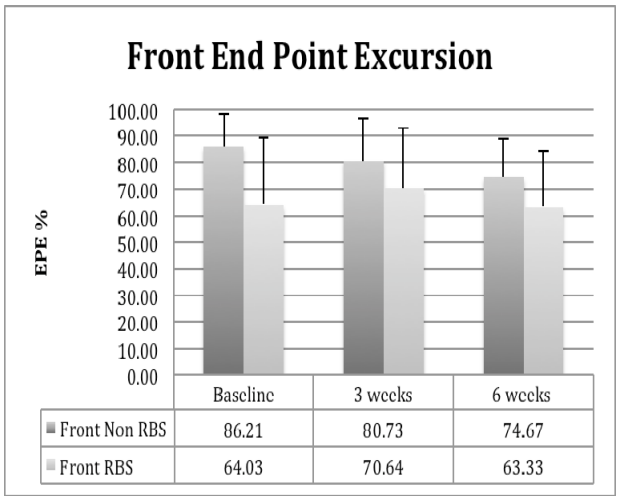

Figure 3: Percentage of Front End-Point Excursion at baseline, week 3, and week 6 with regular shoes (Non RBS) and with RBS shoes.

There were no statistically significant differences among testing sessions.

DISCUSSION

We found that the LOS were affected by wearing RBS shoes and that the participating subjects did not adapt/improve their LOS after 6 weeks of wearing RBS shoes.

Differently from our results, a previous study evaluated standing balance, and reactive balance, and LOS of subjects wearing RBS shoes by Masai Barefoot technologies [3]. The authors found no significant changes in LOS but significant improvement in directional control overtime [3]. One of the limitations of our study, which may help explain the differences, is that we could not track subjects' compliance with the request to wear RBS shoes for at least 8h/day during the 6-week period. Additional studies are necessary to further determine how wearing RBS shoes impacts balance and stability during functional tasks.

CONCLUSION

The findings indicate that LOS are affected by wearing RBS shoes and that people do not adapt to these shoes even after a 6-week period of use.

REFERENCES

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3. Ramstrand N et al. Effects of an unstable shoe construction on balance in women aged over 50 years. *Clinical Biomechanics* 2010; 25: 455-460.