



When the Foot Hits the Ground,
EVERYTHING CHANGES![™]

[PROFESSIONAL HOME](#) [PRODUCTS](#) [SEMINARS](#) [RESEARCH](#) [HOW TO](#) [NEWS](#) [GLOSSARY](#) [CONTACT US](#)

Research

[Research](#) > [Practical Research](#) > [77% of Participants Improve Body Balance By Wearing Foot Levelers Spinal Pelvic Stabilizers](#)

One of the goals of chiropractic care is the improvement of spinal alignment and body balance. Various methods for improving posture have been integral to the history of the profession. Unfortunately, very little research has investigated any of these approaches. One recent study reported finding increased side-to-side weight-bearing asymmetry in patients with low back pain, when compared to healthy control subjects without back pain.¹ A recently completed pilot study highlights some of the challenges, and provides early indications of the improvements in body balance that can be expected with the use of custom-made orthotics.

Study Design and Hypothesis

This pilot study was implemented to assess the feasibility of measuring the impact of wearing orthotics on body balance during relaxed standing. Thirty-five participants were recruited from the general population, and images of their feet in stance phase were obtained using foam casts, following the weight-bearing procedures developed by Monte Greenawalt, DC, DABCO.² Custom-made, flexible Spinal Pelvic Stabilizer Orthotics (UltraStep[®] by Foot Levelers, Inc.) were created from these images for each participant (Fig. 1). On the day of testing, the 35 volunteers were first evaluated wearing their usual footwear. Then, after the custom-made SPS Orthotics were inserted into their shoes, they walked and stood for 30 minutes. After this brief adaptation period, each participant was then re-tested, to measure any change in body balance. In this small, initial study there was no control or sham treatment group.

The null hypothesis was that there would be no difference in body balance between the two conditions - wearing their usual shoes, and after wearing custom-made orthotics in their shoes for 30 minutes.



Electronic Pressure Plates

The instrument used to evaluate body balance was a new device that can rapidly measure the weight being placed on a force plate by the standing volunteer. This unit uses a computer to compare side-to-side pressures, and also front-to-back pressure. The computer quickly takes thousands of measurements to assess the variability of each person's center of gravity, and records a final result only once

- [Products](#)
- [Seminars](#)
- [Research](#)
- [Overview](#)
- [Practical Research](#)
- [Orthopedic Notes](#)
- [Peer-Reviewed](#)
- [Success Express](#)
- [Impressions](#)
- [Books](#)
- [Frequently Asked Questions](#)
- [How To](#)
- [News](#)
- [Glossary](#)
- [Search](#)
- [Public Home](#)
- [My Account](#)
- [Log-Out](#)

the pressures have become stable. Several calculations are then made, which include the percent of body weight that is borne on each foot (left-right balance), and the percent of body weight that is borne on the forefoot and hindfoot (front-back balance). Repeatability of the measurements made by this quadrilateral scale is very good (unpublished data) and reliability testing (inter- and intra-examiner, as well as time-series measurements) is planned.

Participants

Study participants were recruited from the general population, rather than from chiropractic offices. This was done to avoid self-selection and bias from having a pool of people with spinal problems. Certainly, future studies will be designed to look at the body-balancing effects of custom-made orthotics on patients with spinal complaints. However, the intent of this initial study was to avoid the confounding consequences of symptomatic spines and feet. Therefore, each participant completed a questionnaire inquiring about current neck and back symptoms, as well as current foot and leg problems. The volunteers ranged in age from 17 to 60 years of age, with an average (mean) age of 42 years (median = 43). There were 18 males and 17 females in the study group.

Data Analysis

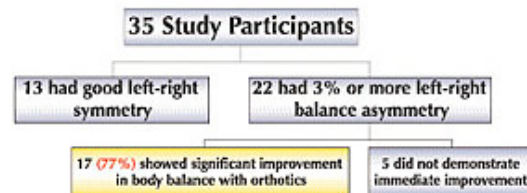
The percent difference between left and right feet (balance asymmetry) was compared in the two conditions (before and after use of orthotics) using a paired-values t-test. The same statistical calculation was applied to the percent difference between front-to-back weight-bearing (toe-heel asymmetry) without and then with orthotics. Both of these calculations were considered significant at $p < 0.05$.

Since people who already are reasonably well-balanced are not expected to improve their balance further with the use of orthotics, a minimum threshold of 3% difference was set as the indicator for the need for orthotics in this study.

Results

Of the 35 participants, 22 had a left-right imbalance in body weight of 3% or more. After wearing custom-made orthotics for 30 minutes, 77% (17 of 22) of the subjects improved in balance. (Fig. 2). The average (mean) improvement was 1.9% [95% CI= 0.29 to 3.49]. This improvement was quite statistically significant at $p = 0.023$.

Twenty-nine volunteers had a front-back imbalance of 3% or more. There was no significant difference or trend found when testing toe-heel balance with the use of orthotics in this group or in the participants as a whole.



Discussion

While this was a small and uncontrolled study, the initial results indicate that further investigation is very appropriate. Formal reliability testing of the quadrilateral scale apparatus is necessary, as is further elucidation of population norms and clinical indicators. Although efforts were made to avoid selection bias and confounding by other treatment effects, these concerns cannot be completely eliminated. Furthermore, it was not feasible to completely eliminate the possibility that some of the participants may have had some amount of leg-length asymmetry. As has been previously reported, a significant leg-length inequality can affect weight-bearing

balance, when measured on bilateral or quadrilateral scales.³ And while most everyone can agree that equal weight on each lower extremity is probably the ideal, the optimal balance of weight between toe and heel is yet to be determined.⁴

Practical Applications

Several previous studies have reported that orthotic shoe inserts do seem to help many patients and athletes, although the mechanism is not well-defined.⁵ Robert Kuhn, DC, DACBR and his fellow researchers at Logan College of Chiropractic have found objective, measurable changes in foot alignment with the use of flexible orthotics,⁶ which also decreased (normalized) the Q-angle and improved patellar tracking, indicating an improved functional alignment of the knee and leg.⁷ David Stude, MS, DC and Danielle Brink, DC at Northwestern College of Chiropractic found that “six weeks of wearing these custom-made, flexible orthotics has a positive influence in promoting balance and proprioceptive symmetry.”⁸ Dr. Stude, along with Jeff Gullickson, DC, also found that the club head speed (swing velocity) of experienced golfers is increased between 3 and 5 miles per hour when wearing custom-made, flexible orthotics.⁹ They also found that the orthotics significantly decreased the effect of fatigue associated with playing nine holes of golf. These and similar studies indicate that the use of orthotics is a reasonable and often necessary adjunct to appropriate chiropractic treatment methods.

Conclusion

This pilot study demonstrated the feasibility of conducting a larger-scale investigation (including sham treatment and control groups) of the ability of custom-made orthotics to improve body balance. It also found evidence of a significant amount of improvement (77%) in left-right balance with a brief period of orthotic use. Custom-made orthotics have been shown to support the feet and provide biomechanical control during gait, and viscoelastic materials can reduce many of the forces imposed on the body by gait-related activities. Weight-bearing asymmetry has been reported in patients with low back pain. The improvement in body balance in those who have asymmetrical weight-bearing may be an important factor contributing to the benefits found with wearing custom-made orthotics.



References

1. Childs JD, Piva SR, Erhard RE, Hicks G. Side-to-side weight-bearing asymmetry in subjects with low back pain. *Man Ther* 2003; 8:166-169.
2. Hyland JK. *Spinal Pelvic Stabilization: A Practical Approach to Orthotic Application*. Roanoke, VA: Foot Levelers, Inc., 2002:32.
3. Lawrence D. Lateralization of weight in the presence of structural short leg: a preliminary report. *J Manip Physiol Ther* 1984; 7:105-8.
4. Vernon H, Grice A. The four quadrant weight scale: a technical and procedural review. *J Manip Physiol Ther* 1984; 7:165-169.
5. Razeghi M, Batt ME. Biomechanical analysis of the effect of orthotic shoe inserts: a review of the literature. *Sports Med* 2000; 29:425-438.

6. Kuhn DR, Shibley NJ, Austin WM, Yochum TR. Radiographic evaluation of weight-bearing orthotics and their effect on flexible pes planus. *J Manip Physiol Ther* 1999; 22:221-226.
7. Kuhn DR, Yochum TR, Cherry AR, Rodgers SS. Immediate changes in the quadriceps femoris angle after insertion of an orthotic device. *J Manip Physiol Ther* 2002; 25:465-470.
8. Stude DE, Brink DK. Effects of nine holes of simulated golf and orthotics intervention on balance and proprioception in experienced golfers. *J Manip Physiol Ther* 1997; 20:590-601.
9. Stude DE, Gullickson J. Effects of orthotic intervention and nine holes of simulated golf on club-head velocity in experienced golfers. *J Manip Physiol Ther* 2000; 23:168-174.