ANALYSIS OF DIFFERENCES IN ANGULAR VELOCITY IN THE SAGITTAL PLANE DURING WALKING ACCORDING TO OUTSOLE CONSTRUCTION
Yi Kyung-ok¹, Seu Ji-Hee¹, Park Seung-Bum²
(Ewha Womans University¹, Korea Footwear Institute², South Korea)

Purpose
The purpose of this study was to evaluate the differences in angular velocity in the sagittal plane according to outsole construction of shoes.

Methods
Five college-aged females served as the subjects for this test. Angular velocity was measured with elevated forefoot shoes, elevated midfoot shoes, and elevated heel (running shoes), with bare foot measurements serving as control for each subject. The Vicon Motion Analysis System measured angular velocity in the neck, spine, shoulder, elbow, wrist, pelvis, hip, knee, and ankle. ANOVA within-subject test design was used for statistical analysis via SAS.

Results
Three test types (barefeet, elevated midfoot, and running shoes) showed similar patterns of angular velocity with slight variations. Compared to barefeet, running shoes showed increased angular velocity in every category, while elevated midfoot shoes showed increased movement in the neck, spine, and ankle in comparison to the control group. Elevated forefoot shoes showed movement patterns different from all other types. Compared to all other shoe types, these shoes had higher levels of angular velocity in almost all areas of the body except for the ankle.

Conclusion
These results demonstrate that different walking strategies arise from the specific limitations of each shoe. Running shoes tilt the body forward, not only increasing angular velocity, but possibly contributing to slouching and bad posture. Elevated forefoot shoes, in contrast activate movement throughout the body because ankle movement is limited and the body is held upright, helping to reduce pain associated with poor posture. Elevated midfoot shoes show the head-forward movement of running shoes, but also show spine activation similar to elevated forefoot shoes. In almost all cases, angular velocity for elevated midfoot shoes is between elevated forefoot shoes and running shoes. Understanding the effects of different shoe types will allow wearers to select shoe types according to their therapeutic / health limitations and needs.

References

Keywords: Movement Analysis