

Relationship Between Mechanical Foot Position and Postural sway

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Structural measures of the foot and balance measures have been described as possible pre-disposing factors for ankle injury. The purpose of this study was to determine the relationship between single leg balance, rear foot angle, and navicular drop. This study used a single occasion repeated measures design. The .05 probability level was considered significant. Thirty subjects (Age 20.8 ± 1.42 ; Ht. 186.26 ± 6.20 cm; Wt. 109.20 ± 21.57 kg) from the University of Kentucky Football team were tested. Subjects were excluded from participation if they suffered a concussion in the past month, experienced any general illness, or were participating in a current lower extremity rehabilitation protocol.

Navicular drop and rear foot angle were measured bilaterally in a standing position using a Vernier Height Gauge and a standard 360° goniometer, respectively. Navicular drop and rear foot angle were calculated as the positional difference between subtalar neutral and relaxed standing position in mm and degrees, respectively. Single limb postural sway measurements were calculated as sway velocity in deg/sec. Three-20sec single-limb eyes- open and closed trials were performed for each extremity using the NeuroCom SMART Balance Master. All testing was performed on a compliant surface using an Airex Balance Pad. Mean right/left navicular drop was 7.8 ± 3.4 & 6.8 ± 2.6 mm, respectively. Mean right/left rear foot angle was 4.33 ± 1.8 & 4.2 ± 1.7 valgus, respectively. Mean eyes open right/left postural sway was $1.04 \pm .43$ deg/sec & $1.01 \pm .25$. Mean eyes closed right/left postural sway was $3.2 \pm .99$ deg/sec & 3.42 ± 1.04 . There was a significant relationship between right & left eyes closed ($r=.604$) and eyes open ($r=.515$) postural sway values. There was no significant relationship between postural sway and navicular drop ($r=-.03 - .17$) or between postural sway and rear foot position ($r=.03-.25$) There was a significant relationship between right navicular drop and right rear foot angle ($r=.645$). However, there was no significant relationship between left navicular drop and left rear foot angle.

While a significant relationship existed between both extremities of the postural sway assessment, the relationship between static foot position measurements and postural sway was not significant. This suggests that postural sway is not affected by foot position.